UNIVERSITY OF ALBERTA

PHOSPHORUS AND NITROGEN DYNAMICS IN STREAMS DRAINING AGRICULTURAL AND ASPEN-DOMINATED FOREST WATERSHEDS ON THE BOREAL PLAIN

BY

SANDRA ELIZABETH COOKE ©

A thesis submitted to the Faculty of Graduate Studies and Research in partial fulfillment of the requirements of the degree of MASTER OF SCIENCE.

in

ENVIRONMENTAL BIOLOGY AND ECOLOGY

DEPARTMENT OF BIOLOGICAL SCIENCES

Edmonton, Alberta
Fall, 1996

National Library
of Canada

Acquisitions and
Bibliographic Services Branch

395 Wellington Street
Ottawa, Ontario
K1A 0N4

Bibliothèque nationale
du Canada

Direction des acquisitions et
des services bibliographiques

395, rue Wellington
Ottawa (Ontario)
K1A 0N4

Your file Votre référence

Our file Notre référence

The author has granted an irrevocable non-exclusive licence allowing the National Library of Canada to reproduce, loan, distribute or sell copies of his/her thesis by any means and in any form or format, making this thesis available to interested persons.

The author retains ownership of the copyright in his/her thesis. Neither the thesis nor substantial extracts from it may be printed or otherwise reproduced without his/her permission.

L'auteur a accordé une licence irrévocable et non exclusive permettant à la Bibliothèque nationale du Canada de reproduire, prêter, distribuer ou vendre des copies de sa thèse de quelque manière et sous quelque forme que ce soit pour mettre des exemplaires de cette thèse à la disposition des personnes intéressées.

L'auteur conserve la propriété du droit d'auteur qui protège sa thèse. Ni la thèse ni des extraits substantiels de celle-ci ne doivent être imprimés ou autrement reproduits sans son autorisation.

ISBN 0-612-18247-9

Canada

UNIVERSITY OF ALBERTA

LIBRARY RELEASE FORM

NAME OF AUTHOR:	**Sandra Elizabeth Cooke**
TITLE OF THESIS:	**Phosphorus and Nitrogen Dynamics in Streams Draining Agricultural and Aspen-Dominated Forest Watersheds on the Boreal Plain**
DEGREE:	**Master of Science**
YEAR THIS DEGREE GRANTED:	**1996**

Permission is hereby granted to the University of Alberta Library to reproduce single copies of this thesis and to lend or sell copies for private, scholarly or scientific research purposes only.

The Author reserves all other publication and other rights in association with the copyright in the thesis, and except as hereinbefore provided neither the thesis nor any substantial portion thereof may be printed or otherwise reproduced in any material form whatever without the author's prior written permission.

Sandra E. Cooke

Sandra E. Cooke
10957 - 74 Avenue
Edmonton, Alberta, Canada T6G 0E5

October 2, 1996

UNIVERSITY OF ALBERTA

FACULTY OF GRADUATE STUDIES AND RESEARCH

The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies and Research for acceptance, a thesis entitled PHOSPHORUS AND NITROGEN DYNAMICS IN AGRICULTURAL AND ASPEN-DOMINATED FOREST WATERSHEDS ON THE BOREAL PLAIN submitted by SANDRA ELIZABETH COOKE in partial fulfillment of the requirements for the degree of MASTER OF SCIENCE in ENVIRONMENTAL BIOLOGY AND ECOLOGY.

E.E. Prepas

Dr. E.E. Prepas, Department of Biological Sciences

M.J. Dudas

Dr. M. Dudas, Department of Renewable Resources

Richard L Rothwell

Dr. R. Rothwell, Department of Renewable Resources

A. Trimbee

Dr. A. Trimbee, Alberta Environmental Protection

September 13, 1996

ABSTRACT

There is limited information on the impact of any land use activity on surface water quality on the boreal plain. Agricultural activities can contribute considerable quantities of nutrients (phosphorus (P) and nitrogen (N)) to downstream surface waters when compared to undisturbed or forested lands. Agriculture, generally considered non-intensive, is well established on the boreal plain and occupies a significant portion of north-central and north-western Alberta. Excessive amounts of P and N can stimulate the biological productivity of surface waters which can deteriorate water quality for specific uses. To quantify the impact of non-intensive agriculture on stream water quality, P (total (TP), total dissolved (TDP), particulate (PP) and soluble reactive (SRP)) and inorganic N (IN) (nitrate (NO_3^-) and ammonium (NH_4^+)) concentrations were measured flow-proportionately with automatic samplers in streams draining aspen-dominated forest land, non-row cropland and cow-calf operations for beef production.

The greatest P and N loads were exported from the cow-calf operations. TP export averaged 13 and 57 kg $km^{-2}yr^{-1}$ from cropland and cow-calf operations, respectively, whereas TP export averaged 12 kg $km^{-2}yr^{-1}$ from the forested watersheds. TDP export averaged 9.5 and 51 kg $km^{-2}yr^{-1}$ from cropland and the two cow-calf operations, respectively, and averaged 81% of the TP export. In contrast, TDP export averaged 5.6 kg $km^{-2}yr^{-1}$ and constituted 43% of the TP export from the forested watersheds. SRP export was 7 and 34 kg $km^{-2}yr^{-1}$ from cropland and cow-calf operations, respectively, and composed 58 and 76% of the TP load, respectively. In contrast, SRP composed only 30% of the TP load from forest land. The disproportionately high export of TDP and SRP from

agricultural land on the boreal plain suggests greater bioavialability of P to downstream surface waters.

Greater IN loads were exported from agricultural land than forested land. Total IN export averaged 3 kg km^{-2}yr^{-1} from the forested watersheds, whereas 31 and 100 kg km^{-2} yr^{-1} was exported from cropland and cow-calf operations, respectively. NH_4^+ composed 89% of the total IN pool in the stream discharging from the cow-calf operations. The predominance of NH_4^+ export from cow-calf operations may be the result of low dissolved oxygen concentrations found in intermittent streams which may prevent the oxidation of NH_4^+ to NO_3^-. Since NH_4^+ is the form of IN that is most available for primary production, cow-calf operations are a direct source of IN for downstream algal growth. In contrast, NO_3^- composed 98% of the total IN pool in the stream draining cropland. Oxygen, present in the soil profile of arable land, can facilitate the oxidation of inorganic fertilizers (e.g. anhydrous ammonia) to NO_3^-. Similarly, NO_3^- export predominated from forest land, composing approximately 57% of the total IN pool. Therefore, agricultural land use influenced the speciation of IN with cow-calf operations being a direct source of IN for primary production.

Most of the TP, NO_3^- and NH_4^+ loads (91, 65 and 96% respectively) were transported in runoff from rainfall in the stream draining cropland. Similarly, rainfall runoff contributed most of the TP (74%) and half of the NH_4^+ load from forest land. Groundwater which maintains baseflow contributed 41% of the total NO_3^- load in the forested watersheds. In contrast, spring runoff transported most of the TP, NO_3^- and NH_4^+ loads (62, 70, 95%, respectively) from the watershed that drained the cow-calf operations, while only contributing 31% of the total runoff volume. Management practices must focus on spring runoff to reduce nutrient loading from cow-calf operations while management practices must address runoff from significant rainfall events to reduce nutrient loads.

TP export from cropland and cow-calf operations on the boreal plain was comparable to low intensive agricultural practices conducted in the Great Lakes region. However, SRP and NH_4^+ export was similar to more intensive agricultural practices (i.e. row-crops, high fertilizer application rates, high livestock densities). The high proportion of SRP in runoff from cropland and cow-calf operations as well as direct runoff from manure likely contributed to high SRP and NH_4^+ export. Similarly, TP export from forested watersheds overlying sedimentary bedrock on the boreal plain was comparable to the TP export from mixed-hardwood forest watersheds overlying sedimentary bedrock in the Great Lakes-St. Lawrence forest region. The boreal plain, however, received 1.5 to 2 times less annual precipitation. High TP concentrations (average 170 $\mu g\ L^{-1}$) combined with lower discharges likely contributed to similar TP export from the forested watersheds on the boreal plain.

Gently sloping topography, circum-neutral stream pH, characteristics of Gray Luvisolic soils and the predominance of montmorillonitic clayey soils likely contributed to the high export of dissolved nutrients (TDP, NO_3^-). Fertilizers and livestock waste probably also enhanced dissolved P and N loads. Further, large supplies of leaf detritus from aspen-dominated forests probably contributed to the high export of particulate phosphorus (PP).

In summary, greater quantities of P and N were exported from agricultural than forested lands to downstream lakes and rivers on the boreal plain. All of the samples taken from the streams draining both cropland and cow-calf operations exceeded the Alberta Surface Water Interim Guidelines of 150μg TP L^{-1}. In contrast, only 23% of the samples exceeded 150μg TP L^{-1} in the streams draining forest land. In addition, TDP and SRP composed most of the TP pool. The disproportionately high concentrations of TDP and SRP suggest a greater P availability for biological production which may increase primary production. Further, exceedingly high loads of NH_4^+ from cattle operations and NO_3^- from cereal and oilseed crop production may also enhance the eutrophication of surface waters. Given the predominance of dissolved nutrient export from agricultural land in the boreal ecoregion, it is critical that management practices focus not only on soil erosion from agricultural land but rather on dissolved and particulate nutrient loads.

ACKNOWLEDGMENTS

I gratefully acknowledge the support and dedication of my supervisor, Dr. Ellie E. Prepas, for remaining deeply committed to this research. I thank members of my committee, Dr. Marvin Dudas, Dr. Richard Rothwell and Dr. Annette Trimbee for valuable discussion and genuine interest in this study.

I acknowledge the support of Mr. David Trew, Water Quality Section, Water Sciences Branch, Alberta Environmental Protection, Dr. Richard Rothwell, Department of Renewable Resources, University of Alberta, and Mr. Glen Bergstrom, Alberta Forest Service for the use of invaluable automatic samplers and other field equipment. I also thank Mr. David Trew for valuable discussion and advice. Further, I am grateful to Mr. Neil MacAlpine and Mr. David Neilson, Conservation and Development Branch, Alberta Agriculture, Food and Rural Development for giving me the time to complete my thesis and the opportunity to apply my knowledge and skills to developing water quality information for Alberta producers.

Funding for this research was provided by the Natural Sciences and Engineering Research Council of Canada in the form of an operating grant to Dr. E.E. Prepas. Financial assistance was also provided by Alberta Water Resources Commission; Alberta Environmental Research Trust Fund and Fish and Wildlife Trust Fund, Alberta Environmental Protection; and the Canadian Circumpolar Institute. I also recognize Dr. Annette Trimbee and Mr. Bruce MacLock, Alberta Environmental Protection for their support of this research. Furthermore, I thank RL&L and the Industrial Research Assistance Program, National Research Council for financial assistance during 1994.

I thank the progressive producers and land owners in the Baptiste Lake watershed who allowed me to conduct my research on their land. Thanks go to the Dupilka, Loziak, Johnson and Ryland families and the Huterian Brethren Church of Baptiste Lake.

I appreciate the technical assistance of Mr. Warren Zyla, Ms. Andrea Smart, Mr. Burk Hantel and Mr. Scott Jamieson for long hours spent in the field (sometimes under adverse conditions) and in the laboratory. Thanks go to Mrs. Gertie Hutchinson, Mrs. Patricia Burgess and Ms. Shelley Manchur for assistance in analyzing many stream nitrogen samples. I also thank Ms. Janice Burke for her diligence and assistance over the past three years and Ms. Sharon Reedyk for sharing her knowledge of stream hydrology. I acknowledge the excellent facilities provided at the Meanook Biological Research Station and appreciate the assistance of Ms. Kathleen Gibson, manager, in the laboratory. Further, I thank fellow grad students, Ms. Kim Burley and Ms. Karen Yee for assistance in the field and moral support.

I am especially grateful for the never-ending support from my parents who have always encouraged me to pursuit my goals and aspirations. Finally, I am forever indebted to Darren Elliott for his enduring patience, endless encouragement and his confidence in me to succeed.

TABLE OF CONTENTS

CHAPTER I

1. General Introduction 1

References 4

CHAPTER II PHOSPHORUS AND NITROGEN DYNAMICS IN STREAMS DRAINING AGRICULTURAL AND ASPEN-DOMINATED FOREST WATERSHEDS ON THE BOREAL PLAIN

2. Introduction 9

Methods and Materials 12

- Study Site Description 12
- Field Sampling 16
- Laboratory Methods 17
- Nutrient Load and Hydrologic Calculations 18
- Statistical Methods 19

Results 19

- Hydrology 19
- Nutrient Export 21
- Phosphorus and Nitrogen Dynamics 25
- Seasonal Patterns of Phosphorus and Nitrogen Loading 32

Discussion 35

References 46

CHAPTER III

3. General Discussion and Conclusions 53

References 56

APPENDICES

APPENDIX A: Summary of monthly flow weighted mean concentrations of total phosphorus (TP), total dissolved phosphorus (TDP), particulate phosphorus (PP), nitrate (NO_3^-) and ammonium (NH_4^+) for the two forested (F1 and F2) and agricultural (A1 and A2, site 1 and 2) watersheds for 1994 and 1995. 58

APPENDIX B: Summary of mean concentrations (±SE) of dominant ions. 65

APPENDIX C: Summary of soil extractable phosphate, ammonium and nitrate and soil pH from the forested (F1 and F2) and agricultural (A1 and A2, site 1 and 2) watersheds. 67

APPENDIX D: Total precipitation from the Athabasca 2 weather station for 1994 and 1995. Data from Environment Canada, Atmospheric Environment Monitoring Service. 69

APPENDIX E: Physical and chemical data from the forested (F1 and F2) and agricultural (A1 and A2, site 1 and 2) watersheds. 72

LIST OF TABLES

Chapter 2.

TABLE 1: Watershed characteristics for the agricultural (A) and forested (F) watersheds in the Baptiste Lake watershed, 1994-1995. 15

TABLE 2: Total volume (m^3) discharged and depth of runoff (mm) in the agricultural (A) and forested (F) watersheds in 1994 and 1995....22

TABLE 3: Export coefficients, expressed as mass per unit area of watershed per year (kg km^{-2} yr^{-1}), for total phosphorus (TP), total dissolved phosphorus (TDP), particulate phosphorus (PP), soluble reactive phosphorus (SRP), nitrate (NO_3^-) and ammonium (NH_4^+) for the 1994 and 1995 sampling season from the agricultural (A) and forested (F) watersheds....24

TABLE 4: Annual flow weighted mean concentrations (μg L^{-1}) for total phosphorus (TP), total dissolved phosphorus (TDP), particulate phosphorus (PP), soluble reactive phosphorus (SRP), nitrate (NO_3^-) and ammonium (NH_4^+) for the 1994 and 1995 sampling season. Flow weighted mean concentrations for the 1994 field season do not include spring runoff....26

TABLE 5: Average export coefficients (kg $km^{-2}yr^{-1}$) and flow weighted mean concentrations (FWMC) (μg L^{-1}) of total phosphorus (TP), soluble reactive P (SRP), nitrate (NO_3^-) and ammonium (NH_4^+) from low and high intensity agriculture in southern Ontario. Adapted from Coote et al. (1982). 39

LIST OF FIGURES

Chapter 2.

FIGURE 1: Map of Alberta showing study site location within the mixed-wood region of the boreal plain. 13

FIGURE 2: Map of the Baptiste Lake watershed showing location of the forested (F1 and F2) and agricultural (A1 and A2) study watersheds. 14

FIGURE 3: Long-term total annual precipitation (mm) from 1960 to 1994 at Athabasca 2 weather station, Environment Canada. 20

FIGURE 4: Comparison between 1994 and 1995 monthly runoff (mm) and the 13 year (1980-1993) average monthly runoff (mm) (± SE). 23

FIGURE 5: Average monthly flow weighted mean concentrations (μg L^{-1}) (± SE) for total phosphorus (TP), total dissolved phosphorus (DP), particulate phosphorus (PP) and soluble reactive phosphorus (SRP) in streams draining the forested (F1 and F2) and agricultural (A1 and A2) watersheds. 28

FIGURE 6 A, B: Variation in precipitation (PPT) (mm), discharge (Q) (m^3 sec^{-1}), total dissolved phosphorus (DP) (μg L^{-1}), and particulate phosphorus (PP) (μg L^{-1}) for the agricultural watersheds A1 (a) and A2 (b). 29

FIGURE 6 C, D: Variation in precipitation (PPT) (mm), discharge (Q) (m^3 sec^{-1}), total dissolved phosphorus (DP) (μg L^{-1}), and particulate phosphorus (PP) (μg L^{-1}) for the forested watersheds F1 (c) and F2 (d). 30

FIGURE 7: Percentage of soluble reactive phosphorus (SRP), total dissolved phosphorus (DP) and particulate phosphorus (PP) of the total phosphorus pool in streams draining the forested (F1 and F2) and agricultural (A1 and A2) watersheds. 31

FIGURE 8: Average monthly flow weighted mean concentrations ($\mu g\ L^{-1}$) (± SE) for nitrate and ammonium in streams draining the forested (F1 and F2) and agricultural (A1 and A2) watersheds..33

FIGURE 9: Percentage of nitrate and ammonium of the total inorganic nitrogen pool in streams draining the forested (F1 and F2) and agricultural (A1 and A2) watersheds..34

FIGURE10: Percentage of the (a) total phosphorus, (b) nitrate and (c) ammonium load of the corresponding total nutrient load transported in spring runoff, rainfall runoff and baseflow in streams draining the forested (F1 and F2) and agricultural (A1 and A2) watersheds......................................36

I. GENERAL INTRODUCTION

Nonpoint source (NPS) pollution is a major source of stream and lake contamination (Pote et al. 1996). Over the past decade, NPS pollution has contributed increasingly to the nations water quality problems (Sharpley et al. 1993) as environmental legislation has focused on controlling point sources of pollution (i.e., municipal and industrial effluent). Further, the treatment of point source pollution is becoming less cost-effective (Sharpley and Meyer 1994). For example, phosphorus (P) removal from municipal wastewater has decreased point source loadings to Lake Erie, however, a reduction in P NPS loads was necessary to improve water quality (Baker 1994). Agricultural land use is a significant contributor of NPS pollution to surface waters and remains the largest unregulated source of water pollution in North America (Offutt 1993)

Nonpoint delivery of nutrients such as P and nitrogen (N) in agricultural runoff can accelerate the eutrophication of surface waters. The result is stimulated algal and rooted aquatic plant growth, depleted dissolved oxygen supplies, and variable pH (Sharpley et al. 1994). Eutrophication can also lead to shifts in phytoplankton populations thus, altering the aquatic food web and influencing higher trophic levels (Sharpley et al. 1994). Furthermore, the growth of noxious blue-green algae may pose a serious threat to human and livestock health as they can produce harmful neuro- and hepato-toxins (Kotak et al. 1993). Likewise, eutrophication restricts the use of surface water for fisheries, recreation, industry, navigation and drinking and therefore, can have serious local and regional economic impacts (Sharpley et al. 1994).

Phosphorus and N are essential macronutrients in aquatic ecosystems (Wetzel 1983). Since certain blue-green algal species can fix atmospheric N, P is usually the primary nutrient limiting phytoplankton and macrophyte growth in fresh water (Ryden et al. 1973; Schindler 1977; Pote et al. 1996). Not all P loaded to surface waters, however, is biologically available to primary producers (Pietilainen and Rekolainen 1991). While total dissolved P (TDP) is, for the most part, immediately available for biological uptake, particulate P (PP) can provide a variable but long-term source of P in lakes (Sharpley et al. 1992). Generally, researchers measure total P (TP) to evaluate the impact of P on surface waters. However, Logan (1982) and Young and DePinto (1982) reported little decrease in the biological productivity of lakes with reduced TP loadings and attributed this to increased bioavailability of P entering the lakes. Therefore, the measurement of bioavailable P may relate more directly to the impact of P on the biological productivity of surface waters (Ryden et al. 1973; Sharpley et al. 1992).

Many watershed studies have examined NPS nutrient loading of P and N to streams and lakes. These studies evaluated the impact of various land uses on surface water quality in relation to nutrient and eutrophication managment (e.g., Hobbie and Likens 1973; Dillon and Kirchner 1975; Omernik 1977; Clesceri et al. 1986; Pietilainen and Rekolainen 1991). For example, forest watersheds that included pastureland exported twice as much P than exclusively forested watersheds (Dillon and Kirchner 1975). Likewise, forest havesting can increase nutrient loads to surface waters. For instance, a 12-fold increase in stream P loads was found in clear cut watersheds where a herbicide was applied to prevent regrowth when compared to control watersheds in the Hubbard Brook Experimental Forest, New Hampshire (Hobbie and Likens 1973). Agricultural practices can also increase nutrient loads to surface waters. A comprehensive study on 11 agricultural watersheds in southern Ontario showed that more intensive agricultural practices (i.e., row crop production) contributed proportionately higher nutrient loads to surface waters than watersheds with less than 20% of the total area devoted to row crop cultivation (Coote et al. 1982). Generally, anthropogenic impacts on the landscape (i.e., deforestation, agriculture) can increase nutrient loads to surface waters; however, variations in watershed characteristics prevent the use of generalized nutrient export coefficients.

Watershed characteristics (i.e. slope, geology, hydrology, soil texture and soil and vegetation type) have been related to nutrient export. For example, a positive relationship was found between TP export from agricultural lands to the percentage of clay present in the soil and to the amount of P added to the soil as fertilizer or manure (Miller et al. 1982). In addition, P export was postively correlated to the percentage of cropland area within a watershed (Hill 1981). However, lower stream discharge from agricultural watersheds reduced the contrast in nutrient export when compared to non-agricultural watersheds (Hill 1978; 1981). Furthermore, studies report relationships between watershed physiographic features such as slope and geology and water quality parameters. For instance, a strong negative relationship between TP and catchment slope was found in 30 Precambrian Shield lakes of southeastern Quebec by D'arcy and Carignan (1996). Vegetation (i.e., coniferous or deciduous), however, had little detectable infuence on lake water quality (D'arcy and Carignan 1996). Also, a 2-fold increase in P exports was found from watersheds overlying sedimentary bedrock as opposed to watersheds overlying igneous bedrock (Dillon and Kirchner 1975). Thus, watershed characteristics can influence nutrient export and should be included in the interpretation of nutrient export data from specific watersheds.

Although many watershed studies have published nutrient export coefficients, few studies had adequate sampling designs that included dramatic short-term changes in discharge from storm runoff to estimate accurate nutrient loads (Meyer and Likens 1979; Beaulac and Reckhow 1982; Munn and Prepas 1986). For example, in the Lyngbygaards River, Denmark, 72% of the annual particulate inorganic material transport occured in only 17.6 days (Krongvang 1992). Likewise, 68% of the TP export was transported in 12 days in two coniferous-dominated forest watersheds in central Alberta (Munn and Prepas 1986). Therefore, a sampling design with high sampling frequency is important to capture nutrient pulses during high flow periods (Walling and Webb 1982; Richards and Holloway 1987; Young et al. 1988; Rekolainen 1989). Nutrient loads, however, are either under- or over-estimated depending on sampling interval in most studies (Stevens and Smith 1978). Few studies incorporate flow-proportionate sampling (i.e., increased sampling during storm runoff); many studies calculate nutrient export coefficients based on insufficient sampling designs (i.e., weekly or bi-monthly intervals); and some studies calculate annual nutrient loads based on mean nutrient concentrations and mean normalilzed annual stream flow. Therefore, while detailed land use information is available, nutrient export coefficients are not available at the same level of detail (Frink 1991).

There are few nutrient export data published for boreal plain watersheds with different land uses (i.e., forest, agriculture, forest harvesting). Alberta Environmental

Protection have assessed P export from intensive livestock use in the Majaeu Creek watershed (Mitchell and Hamilton 1982), and assessed nutrient export in relation to lake trophic status for Baptiste Lake (Trew et al. 1987) and Lake Wabamun (Mitchell 1985). However, the nutrient export coefficients were derived from insufficient sampling strategies (e.g., every other day, twice per week, weekly) and inadequate laboratory methodologies which precluded the use of the nutrient data. P export from two coniferous-dominated boreal streams in central Alberta, however, was quantified from an intensive flow-proportionate sampling regime (Munn and Prepas 1986) Consequently, this is the only comprehensive nutrient export study on the boreal plain.

On the boreal plain, there are few data to describe nutrient export from agricultural land use on the boreal plain. Agricultural activities are well established throughout north-central and north-western Alberta. Therefore, I quantified the impact of non-intensive agriculture on stream water quality on the boreal plain. The goals of my research were twofold: (1) to determine accurate estimates of total, dissolved, particulate and soluble reactive P and inorganic N (nitrate and ammonium) export through flow-proportionate sampling from two common agricultural practices on the boreal plain: 1) non-row cereal and oilseed cultivation and 2) cow-calf operation for beef production on the boreal plain and compare those with P and N export from two aspen-dominated forest watersheds in the same region; and (2) to quantify the relative seasonal contribution of P and N export during spring snowmelt and rainfall runoff. In additon, I discussed the influence of various watershed characteristics (i.e., slope, soil and vegetation type) indicative to the boreal plain ecoregion on P and N export. The results of this study will assist in the evaluation of other land uses, including forest harvesting, on surface waters located on the boreal plain.

REFERENCES

BAKER, D.B. 1993. The Lake Erie Agroecosystem Program: water quality assessments. Agriculture, Ecosystems and Environment 46:197-215.

BEAULAC, M.N., AND K.H. RECKHOW. 1982. An examination of land use-nutrient export relationships. Wat. Resour. Bull. 18:1013-1024.

CLESCERI, N.L., S.J. CURRAN, AND R.I. SEDLAK. 1986. Nutrient loads to Wisconsin lakes: Part I Nitrogen and phosphorus export coefficients. Wat. Resour. Bull. 22:983-990.

COOTE, D. R., E.M. MACDONALD, W.T. DICKINSON, R.C. OSTRY, AND R. FRANK. 1982. Agriculture and water quality in the Canadian Great Lakes Basin: I. Representative agricultural watersheds. J. Environ. Qual. 11(3): 473-481.

D'ARCY, P. AND R. CARIGNAN. 1996. Influence of catchment topography on water chemistry in southeastern Quebec Shield lakes. Can. J. Fish. Aquat. Sci. 53:

DILLON, P.J., AND W.B. KIRCHNER. 1975. The effects of geology and land use on the export of phosphorus from watersheds. Water Research. 9:135-148.

FRINK, C.R. 1991. Estimating nutrient exports to estuaries. J. Environ. Qual. 20: 717-724.

HILL, A.R. 1978. Factors affecting the export of nitrate-nitrogen from drainage basins in southern Ontario. Water Research 12:1045-1057

HILL, A.R. 1981. Stream phosphorus exports from watersheds with contrasting land uses in southern Ontario. Water Resources Bulletin. 17(4): 627-634.

HOBBIE, J.E., AND G.E. LIKENS. 1973. Output of phosphorus, dissolved organic carbon, and fine particulate carbon from Hubbard Brook watersheds. Limnol. Oceanogr. 18:734-742.

KOTAK, B.G., S.L. KENEFICK, D.L. FRITZ, C.G. ROUSSEAUX, E.E. PREPAS, AND S.E. HRUDEY. 1993. Occurrence and toxicological evaluation of cyanobacterial toxins in Alberta lakes and farm dugouts. Wat. Res. 27: 495-506.

KRONGVANG, B. 1992. The export of particulate matter, particulate phosphorus and dissolved phosphorus from two agricultural river basins: implications on estimating the non-point phosphorus load. Wat. Re. 26:1347-1358.

LOGAN, T.J. 1982. Mechanisms for release of sediment-bound phosphate to water and the effects of agricultural land management on fluvial transport of particulate and dissolved phosphate. Hydrobiologia 92:519-530.

MEYER, J.L., AND G.E. LIKENS. 1979. Transport and transformations of phosphorus in a forest stream ecosystem. Ecology 60:1255-1269.

MILLER, M.H., J.B. ROBINSON, D.R. COOTE, A.C. SPIRES, AND D.W. DRAPER. 1982. Agriculture and water quality in the Canadian Great Lakes Basin: III. Phosphorus. J. Environ. Qual. 11: 487-492.

MITCHELL, P. AND H. HAMILTON. 1982. Assessment of phosphorus export from the Majeau Creek watershed, Lac La Nonne. Water Quality Control Branch, Pollution Control Division, Alberta Environment, 17p.

MITCHELL, P. 1985. Preservation of water quality in Lake Wabamun. Lake Wabamun eutrophication study. Water Quality Control Branch, Pollution Control Division, Alberta Environment, 26p.

MUNN, N., AND E.E. PREPAS. 1986. Seasonal dynamics of phosphorus partitioning and export in two streams in Alberta. Can. J. Fish. Aquat. Sci. 43: 2464-2471.

OFFUTT, S. 1993. Agriculture's role in protecting water quality. J. Soil Water Cons. 48: 94-95.

OMERNIK, J.M. 1977. Nonpoint source-stream nutrient level relationships: a nationwide study. EPA-600/3-77-105. United States Environmental Protection Agency, Corvallis, Oregon, USA. 106p.

PIETILAINEN, O-P., AND S. REKOLAINEN. 1991. Dissolved reactive and total phosphorus load from agricultural and forested basins to surface waters in Finland. Aqua Fennica 21: 127-136.

POTE, D.H., T.C. DANIEL, A.N. SHARPLEY, P.A. MOOR, JR., D.R. EDWARDS, AND D.J. NICHOLS. 1996. Relating extractable soil phosphorus to phosphorus losses in runoff. Soil Sci. Soc. Am. J. 60:855-859.

REKOLAINEN, S. 1989. Phosphorus and nitrogen load from forest and agricultural areas in Finland. Aqua Fennica. 19:95-107.

RICHARDS, R.P., AND J. HOLLOWAY. 1987. Monte carlo studies of sampling strategies for estimating tributary loads. Wat. Resourc. Res. 23:1939-1948.

RYDEN, J.C., J.K. SYERS, AND R.F. HARRIS. 1973. Phosphorus in runoff and streams. Advances in Agronomy 25: 1-45.

SHARPLEY, A.N, S.J. SMITH, O.R. JONES, W.A. BERG, AND G.A. COLEMAN. 1992. The transport of bioavailable phosphorus in agricultural runoff. J. Environ. Qual. 20:30-35.

SHARPLEY, A.N., S.C. CHAPRA, R. WEDEPOHL, J.T. SIMS, T.C. DANIEL, AND K.R. REDDY. 1994. Managing agricultural phosphorus from protection of surface waters: Issues and options. J. Environ. Qual. 23: 437-451.

SHARPLEY, A.J., T.C. DANIEL, AND D.R. EDWARDS. 1993. Phosphorus movement in the landscape. J. Prod. Agric. 6:492-500.

SHARPLEY, A.J., AND M. MEYER. 1994. Minimizing agricultural non-point source impacts: A symposium overview. J. Environ. Qual. 23:1-3.

STEVENS, R.J., AND R.V. SMITH. 1978. A comparison of discrete and intensive sampling for measuring the loads of nitrogen and phosphorus in the river Main, County Antrim. Water Research 12: 23-830.

TREW, D.O., D.J. BELIVEAU, AND E.E. YOUNGE. 1987. The Baptiste Lake study technical report. Water Quality Control Branch, Pollution Control Division, Environmental Protection Services, Alberta Environment. 380p.

YOUNG, T.C., AND J.V. DEPINTO. 1982. Algal-availability of particulate phosphorus from diffuse and point sources in the lower Great Lakes basin. Hydrobiologia 91:111-119.

YOUNG, T.C., J.V. DEPINTO, AND T.M. HEIDTKE. 1988. Factors affecting the efficiency of some estimators of fluvial total phosphorus load. Wat. Resourc. Res. 24: 1535-1540.

WALLING, D.E., AND B.W. WEBB. 1982. The design of sampling programs for studying catchment nutrient dynamics. Proc. Symp. Hydrolog. Research Basins. 3:747-758.

WETZEL, R.G. 1983. Limnology. 2nd Edition Saunders College Publishing, Toronto, Ont. 767p.

II. PHOSPHORUS AND NITROGEN DYNAMICS IN STREAMS DRAINING AGRICULTURAL AND ASPEN-DOMINATED FOREST WATERSHEDS ON THE BOREAL PLAIN[1]

INTRODUCTION

Control of phosphorus (P) and nitrogen (N) is of prime importance in reducing eutrophication of surface waters (Sharpley and Menzel 1987; Hill 1978). In lakes, elevated P and N concentrations stimulate phytoplankton and often cyanobacterial growth. Increased primary production can lead to the deterioration of surface waters for recreation, fisheries, human consumption, and industry uses. Therefore, the eutrophication of surface waters can have negative local and regional economic consequences (Sharpley et al. 1994). High P and N concentrations in streams and rivers can also result in increased standing stock of periphyton, benthic invertebrates and macrophytes that can decrease channel capacity (Perrin et al. 1987; Johnston et al. 1990; Chambers et al. 1991). Primary production in most temperate freshwater lakes is often limited by P (Ryden et al. 1973; Schindler et al. 1977), whereas N limitation is uncommon as some phytoplankton can fix atmospheric N (Wetzel 1983). However, large quantities of N loaded to lakes and rivers can enhance eutrophication (Hill 1978). In addition, high concentrations of ammonium as NH_4OH can be toxic to many aquatic organisms, especially fish, within certain pH and temperature ranges (Wetzel 1983). Since P and N are essential limiting macronutrients in aquatic ecosystems (Wetzel 1983), information is needed on the factors controlling the exchange of P and N from watersheds to surface waters.

Many studies have examined non-point source nutrient loading of N and P to streams and lakes (e.g., Dillon and Kirchner 1975; Omnernik 1977; Pietilainen and Rekolainen 1991). Such studies attempt to quantify the impact of various land uses on surface water quality and relate watershed characteristics (i.e. geology, physiography, hydrology, soil texture and soil and vegetation type) to the quantity of nutrients delivered to surface waters (e.g., Neilsen and MacKenzie 1977; Hill 1978; Dillon et al. 1991; D'Arcy and Carignan 1996). For example, mixed hardwood forested watersheds overlying igneous bedrock exported less than half of the total P (TP) than forested watersheds overlying sedimentary bedrock in the Great Lakes-St. Lawrence Forest region (Dillon and Kirchner 1975). Furthermore, forested watersheds overlying either sedimentary or igneous bedrock that included pastureland exported twice the TP than exclusively forested watersheds. Additionally, the mean TP export from watersheds overlying sedimenatary bedrock used solely for agriculture was double the TP export from forested watersheds that included pastureland (Dillon and Kirchner 1975). Similarly, agricultural land exported about 2.9 times more TP than forested land, whereas total inorganic nitrogen (IN) export was over 13 times greater from agricultural than from forested land (Omernik 1977). P and N export have been calculated for various regions throughout North America and elsewhere. However, there are few nutrient export data published for streams draining boreal plain watersheds.

---

[1] A version of this chapter will be submitted for publication in *Canadain Journal of Fisheries and Aquatic Sciences*

Most studies generally attempt to quantify TP export. These data are used to develop empirical models to predict TP concentrations in lakes (e.g., Dillon and Rigler 1975; Kirchner 1975; Prairie and Kalff 1986) and lake productivity (e.g., Dillon and Rigler 1974; Prepas and Trew 1983; Riley and Prepas 1984). However, it is difficult to estimate the impact of TP in runoff on standing waters (Ryden 1973) as TP includes particulate P (PP) that may be unavailable for algal uptake (Sharpley and Menzel 1987). Biologically available P, however, may be more strongly related to water quality and productivity in a receiving lake (Ryden et al. 1973; Pietilainen and Rekolainen 1991; Sharpley et al. 1991); may increase the predictive power of empirical lake productivity models; and may improve lake management strategies (Bostrom et al. 1988) than the measurement of TP. Most P exported to surface waters from cultivated and forested land is usually in the particulate form (Omernik 1977; Sharpley and Menzel 1987; Krongvang 1992; Vaithiyanathan and Correll 1992), while the total dissolved P (TDP) and orthophosphorus (measured as SRP) fractions generally compose less than 50% of the TP export (Omnenik 1977; Pietilainen and Rekolainen 1991). TDP, however, is more readily available for biological uptake (Sharpley et al. 1992), while high concentrations of SRP (>30 μg L^{-1}) is immediately available (Bostrom et al. 1988). Despite the significance of the various forms of P in assessing the overall impact on lake productivity, few studies have focused on quantifying TDP and SRP export.

Most nutrient export coefficients have been extrapolated from data collected under inadequate sampling regimes (i.e. samples collected every 1 to 2 weeks). This sampling frequency does not capture short-term peaks in runoff; nutrient loads are then likely underestimated (Stevens and Smith 1978; Rigler 1979). Further, only a few studies have quantified nutrient export based on intensive flow-proportionate sampling (i.e. increased sampling during storm runoff) for forested (e.g. Meyer and Likens 1979; Munn and Prepas 1986) and agricultural (e.g. Coote et al. 1982; Baker 1993) watersheds. In addition, accurate characterization of either loads or average concentrations requires very dense sampling due to wide fluctuations in stream nutrient concentrations which is generally due to extreme changes in stream discharge (Richards and Baker 1993). Flow-weighted mean concentrations, discharge-adjusted nutrient concentrations over time, can reduce the variability of the raw data (Richards and Baker 1993). Therefore, to accurately quantify nutrient loads and detect differences in stream nutrient concentrations, sampling frequency must describe both peak and base flows and nutrient concentrations must be flow-weighted.

Limited P and N export data are available for watersheds on the boreal plain. There are few P and N export data from either agricultural land or forested land on the boreal plain. The purpose of this study was to quantify P (total, dissolved, particulate and soluble reactive) and total inorganic N (nitrate and ammonium) export from two aspen-dominated forested and two agricultural watersheds on the boreal plain of Alberta over a two year period (1994-1995). Based on export coefficients reported in studies conducted in Ontario and throughout the United States, I predicted a 2- and 10- fold increase in TP and total IN export, respectively, from the agricultural watersheds than from the forested watersheds. Additionally, the influence of season on P and N export was investigated.

The results of this study will form a baseline to evaluate land uses, such as agriculture and forest harvesting, on the boreal plain.

MATERIALS AND METHODS

Study Site Description

The Baptiste Lake watershed (54° 45'N; 113° 33'W) is located on the boreal plain of north-central Alberta (Figure 1). Sedimentary bedrock underlying glacial till that ranges in thickness from 30 to 100 m are the primary surficial deposits (Kjearsgaard 1972). Dark Gray/Orthic Gray Luvisols of lacustrine origin are the predominant soil types within the Baptiste Lake watershed (Kjearsgaard 1972). One third of the total watershed area draining forest land consists of poorly drained organic soils in depressional areas.

Four smaller watersheds within the Baptiste Lake watershed were chosen according to land use (Figure 2; Table 1). Most (53%) of the vegetative cover in the two forested watersheds (F1 and F2) consisted of aspen (*Populus tremuloides*) and balsam (*Populus balsamifera*) poplar. White (*Picea glauca*) and black (*Picea mariana*) spruce accounted for one-third of the total forested area, while treed muskeg and scrublands composed the remaining area (<14%). The second order, perrenial streams draining the forested watersheds had average streambank widths of 2-3 m with numerous (>10) beaver dams. Anthropogenic disturbance in the forested watersheds was minimal during the two years of study. Long-term (13 year) stream discharge data were available from a Water Survey of Canada (WSC) stream gauging station for watershed F1.

The agricultural watersheds were chosen to represent common agricultural land use on the boreal plain. Most (80%) of the total area in watershed A1 was in non-row crop cultivation of barley and canola. Fertilizer application rates on non-row cropland averaged 47.8 kg N ha^{-1} and 22.7 kg P ha^{-1}. In watershed A2, almost 60% of the total area was devoted to mixed agricultural activities including two cow-calf operations for beef production and non-row crop cultivation (43 and 57% of the total agricultural area, respectively). The remaining area, 20 and 40% of the total watershed areas for A1 and A2, respectively, were managed woodlots and farmsteads. Both cow-calf operations

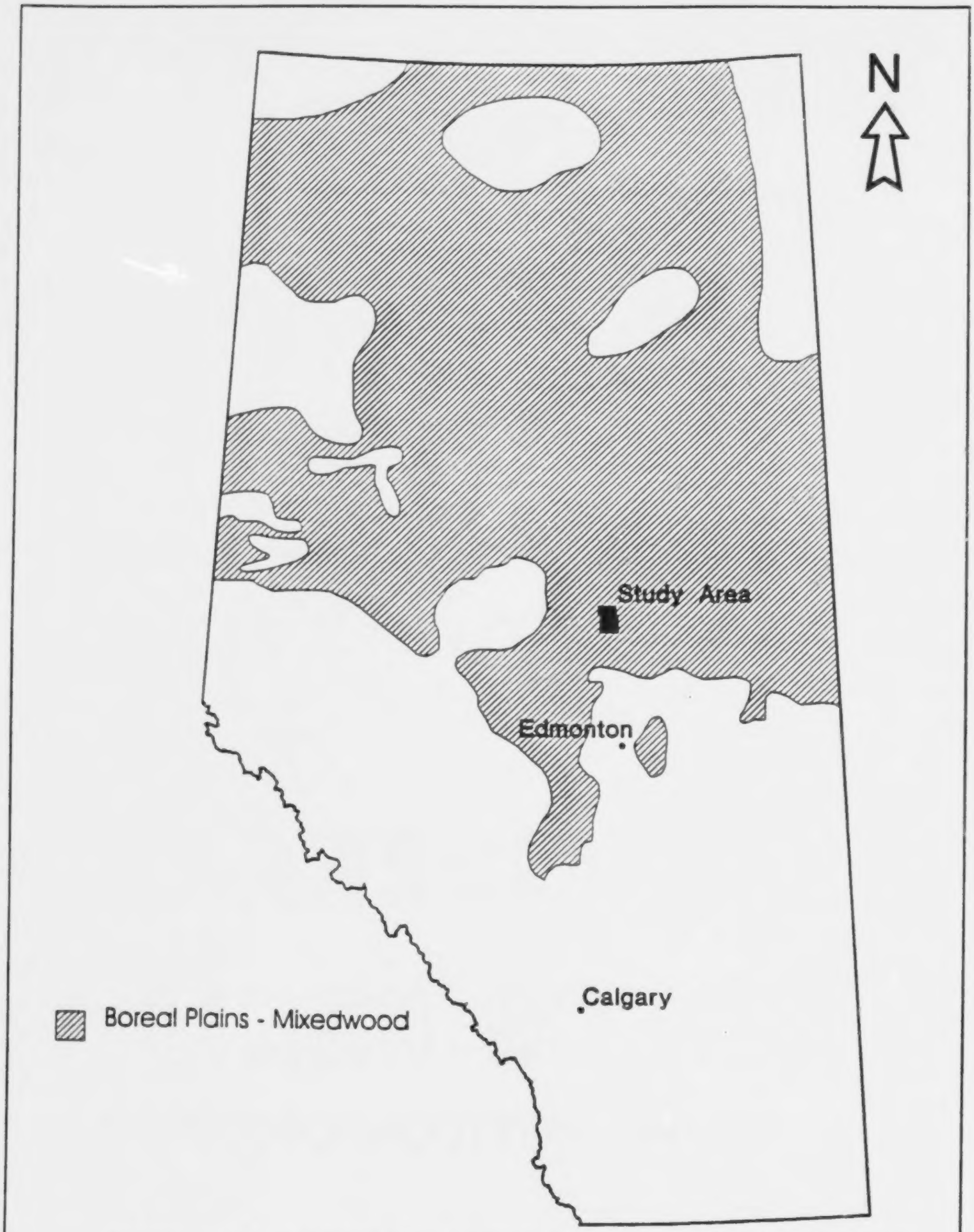

FIGURE 1: Map of Alberta showing study site location within the mixedwood region of the boreal plain (adapted from Strong and Leggat (1992) and National Atlas of Canada (1996))

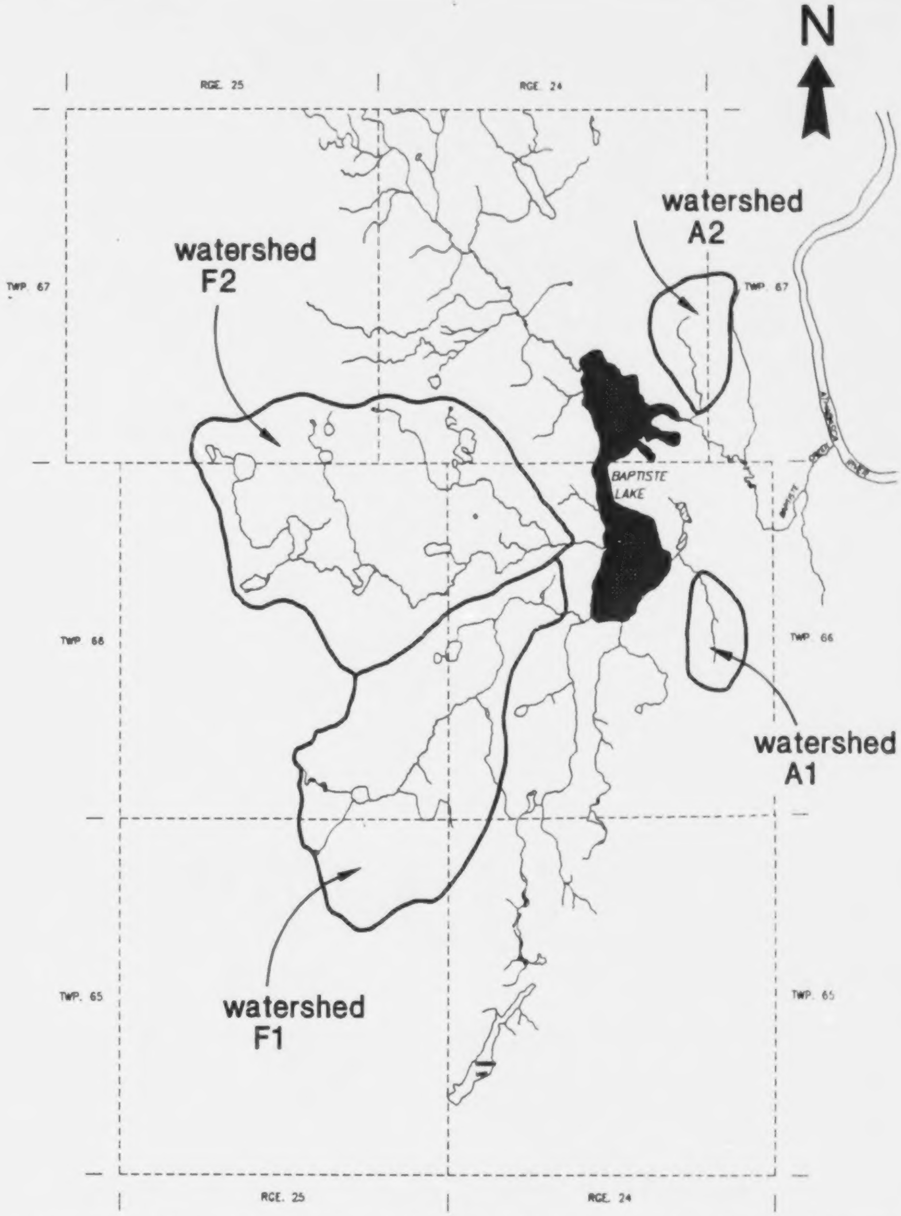

FIGURE 2: Map of the Baptiste Lake watershed showing location of the aspen-dominated forest (F1 and F2) and agricultural (A1 and A2) study watersheds. Watershed A1 drains non-row cropland. Watershed A2 drains 2 cow-calf operations.

Table 1: Watershed characteristics for the agricultural (A) and forested (F) watersheds in the Baptiste Lake watershed, 1994-1995.

Watershed	Area (km^2)	Slope (%)	Stream pH ± SE	% Land Use	
F1	57.4	7.0	7.6	53 %	deciduous^a
			± 0.09	33 %	treed muskeg/scrublands
				14 %	coniferous^b
F2	60.1	6.0	7.6	53 %	deciduous^a
			± 0.06	35 %	treed muskeg/scrublands
				12 %	coniferous^b
A1	3.8	4.0	7.0 ± 0.08	80 %	non-row crop cultivation; barley and canola
A2	6.6	4.0	7.6 ± 0.01	25 %	- 2 cow-calf operations; ~125 animal units in total
				34 %	- non-row crop cultivation; barley and canola

a - deciduous forest composed of aspen & balsam poplar; *Populus tremuloides,Populus balsamifera*
b - coniferous forest composed of black & white Spruce; *Picea mariana, Picea glauca*

raised cattle year-round with the over-wintering sites located adjacent to the stream channel. During the summer, cattle had free access to the stream. One sampling site was located in each watershed upstream of the stream-lake confluence to avoid backflow from the lake. There were two sampling stations in watershed A2. Site 1 was located downstream of a 100-head cow-calf operation and downstream of site 2 which was located downstream of a 25-head cow-calf operation. Both streams draining the agricultural watersheds were first order and intermittent; flowing only during spring runoff and large rainfall events. Watershed A2 drained into Baptiste Creek which emptied into the Athabasca River, while the remaining streams flowed into Baptiste Lake.

Field Sampling

Stream sampling started after spring runoff (early May) until the streams were frozen (late October) in 1994 and throughout the open-water season in 1995 (March through September 1995). A calibrated Gurley pygmy current meter was used to determine stream current velocity and measure water depth at 20-cm intervals across the stream width in both forested watersheds and site 1 in watershed A2. The stream channel in watershed A1 was not well defined, therefore a 90° V-notch weir was installed in 1995 to estimate stream discharge based on equation (1), relating upstream depth or head (H) to discharge (Q):

$$Q = 1.34\, H^{2.48} \tag{1}$$

where Q ($m^3\ sec^{-1}$) and H (m) (Gordon et al. 1994). However, in 1994, stream surface velocity was measured by observing the time required for a float to traverse a known distance downstream. Stream discharge was calculated by multiplying stream cross-sectional area, surface velocity and a correction factor of 0.80 for rough stream beds (Gordon et al. 1994). At site 2, in watershed A2, stream discharge was measured volumetrically as runoff was channeled to a natural overfall. A series of point measurements of stage described each stream's hydrograph in 1994, whereas automatic stage recorders, as described by Reedyk et al. (submitted), recorded continuous measurements of stage in 1995. Simultaneous measurements of discharge and stage were recorded over a large range of stream flows and used to calculated stage-discharge relationships ($r^2 > 0.80$) for each stream.

Since smaller agricultural watersheds produced steep, short duration peaks in discharge as compared to the larger forested watersheds, automatic samplers were programmed to collect discrete water samples during peak discharge periods (spring runoff and rainfall) at 2-h intervals. Water samples were collected every 4 h in the forested watersheds. Each water sample was analyzed during peak flows; however, water samples from each stream were pooled and analyzed as one daily composite sample for periods of low flow. During spring runoff, automatic samplers were programmed to sample between 08:00 and 18:00 h, since low air temperatures at night froze the streams and prevented the automatic samplers from collecting water samples. Grab samples were collected during each stream site visit, approximately every two d during periods of low flow and three to four times daily during periods of storm flow. Grab samples were taken in the middle of each stream at mid-depth with 250-mL polystyrene containers for nitrogen analyses and 1-L Naglene polyethylene bottles for phosphorus, alkalinity, pH and conductivity analyses. Water samples were stored on ice in the field and refrigerated at 4°C in the laboratory prior to analysis.

Laboratory Methods

Total phosphorus (TP) and ammonium (NH_4^+) were determined on unfiltered stream water. Total dissolved P (TDP), soluble reactive phosphorus (SRP) and nitrate+nitrite (NO_3^-) were determined on stream water samples filtered through a prerinsed 0.45-µm Millipore HAWP membrane filter. TP and TDP were analyzed according to Menzel and Corwin's (1965) potassium persulfate method as modified by Prepas and Rigler (1982); SRP was determined according to Murphy and Riley's (1962) molybdenum blue method on undigested samples. Particulate P (PP) was calculated as the difference between TP and TDP. Ammonium (NH_4^+) was analyzed according to Solorzano's (1969) phenolhypochlorite method, whereas NO_3^- was determined by the cadmium-copper reduction method of Stainton et al. (1977). A Beckman 10 pH meter was used to measure stream pH on water samples at 25°C within 24 h of collection.

Total inorganic nitrogen (IN) was the sum of NH_4^+ and NO_3^-. All stream samples were prepared within 24 h of collection and analyzed in duplicate from which the mean concentration was reported.

Nutrient Load and Hydrologic Calculations

Total nutrient load was calculated by summing the product of nutrient concentration and discharge between each sampling interval (Munn and Prepas 1986; Ng et al. 1992). Nutrient export coefficients were computed by dividing the total nutrient load (kg) by watershed area (km^2). Flow-weighted mean concentration (FWMC) is equivalent to the loading rate or discharge-adjusted load and is defined as:

$$\mathrm{FWMC} = \frac{\sum c_i q_i t_i}{\sum q_i t_i} \qquad (2)$$

where c_i is the concentration in the ith sample, q_i is the instantaneous flow associated with the ith sample, and t_i is the time represented by the ith sample (Richards and Baker 1993). Monthly and annual nutrient flow-weighted mean concentrations (FWMC) were calculated for each stream.

Estimated P (TP, TDP, and PP) loads for spring runoff (March and April) during 1994 for all watersheds were related to WSC stream discharge data and 1995 flow-weighted mean P concentrations collected during spring runoff. A rating equation was calculated to extrapolate WSC stream discharge data to the sampling sites on the forested watersheds (F1 and F2). Since hydrologic characteristics were different between the agricultural and forested watersheds, total runoff volumes for spring runoff were calculated for each agricultural watershed (A1 and A2) based on total depth of runoff (mm) (unit area yield of runoff (dam^3 km^{-2})) at the WSC stream gauging station for spring runoff. Nutrient loads for spring runoff in 1994 were added to the calculated P loads for the remaining year to produce annual P loads for each watershed.

Long-term (1980 - 1993) monthly stream discharge data from WSC were used to calculate mean monthly runoff (mm) for March through to October. Long-term mean monthly runoff were compared to monthly runoff during 1994 and 1995. Also, annual precipitation data (1952 to 1994) were obtained from Environment Canada to compare long-term mean annual precipitation to the precipitation during 1994 and 1995.

Statistical Methods

To satisfy normality and homogeneity of variance, all data were log-transformed.. A *t*-test compared 1994 and 1995 stream monthly FWMC of TP, TDP and PP for each watershed to determine differences between sampling years. Differences in monthly FWMC between each watershed were determined by analysis of variance (ANOVA) for 1994 and 1995 nutrient data. Following ANOVA, a Bonferoni multiple comparison test identified differences in nutrient chemistry among watersheds. Bonferoni multiple comparison test sets the error rate for each test to the experimentwise error rate divided by the total number of tests (Norisus 1993). A Least Significant Difference (LSD) multiple comparison test determined pairwise differences, with no adjustment to error rate, between monthly FWMC of NO_3^- and NH_4^+. All statistical analyses were performed on SPSS version 6.0 (Norusis 1993).

RESULTS

Hydrology

A total of 562 and 548 mm of precipitation fell on the Baptiste Lake watershed during 1994 and 1995, respectively. Both study years had above average precipitation (1960 to 1995 average annual precipitation was 496 mm; data from Environment Canada) (Figure 3). Approximately 46 and 62% of the total annual precipitation fell during the summer months (June through August) in 1994 and 1995, respectively. Rainfall runoff ranged from 60 to 93% of the total runoff from the agricultural watersheds, whereas rainfall runoff ranged from 55 to 67% of the total runoff from the forested watersheds. Relatively little runoff resulted from snowmelt in the cropland and forested watersheds (<8 and 18%, respectively). In contrast, snowmelt produced 31 to 40% of the total runoff from the cow-calf operations (A2). Snowfall was above average conditions (Alberta Environmental Protection 1994) in 1993-94 than in 1994-95 with 133 and 50 mm of snowfall, respectively.

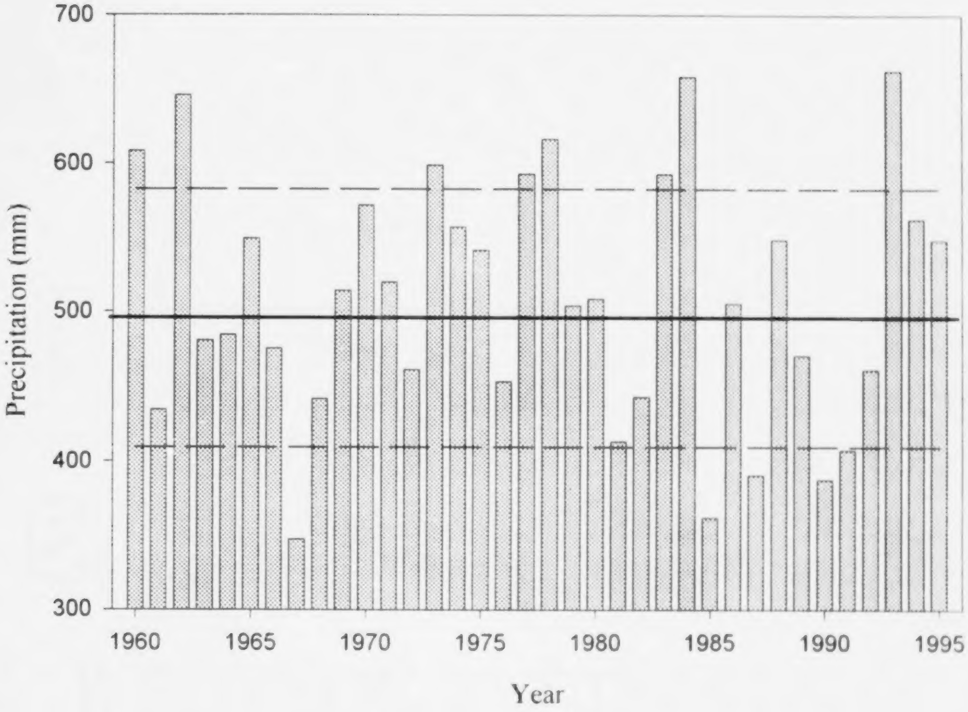

FIGURE 3. Long-term total annual precipitation (mm) from 1960 to 1995 with Long-term (40 year) mean total precipitation (——) ± one standard deviation (------).

Total runoff (mm) and total discharge (m^3) was generally greater from the forested as opposed to the agricultural watersheds for both years of study (Table 2). During 1994, monthly runoff in watershed F1 was greater than the long-term 13-year average for March through July, whereas monthly runoff for August through October was similar to the long-term average. Runoff was above the long-term average during the month of August in 1995, as a result of a one-in-twenty year storm event. However, runoff for the remaining months in 1995 was average to below average (Figure 4).

Nutrient Export

In general, P and N export were greater in streams draining agricultural land than in streams draining exclusively forested land. Cropland (A1) and forest land (F1 and F2) exported comparable quantities of TP and TDP during 1994. In 1995, however, TP and TDP export was at least 1.3 and 2.5 times greater, respectively, from cropland than from forest land. Likewise, TP and TDP export from the cow-calf operations (A2) averaged five- and 10-times higher, respectively, than from either forested basin. Furthermore, TP and TDP export from the cow-calf operation were at least three- and five-times greater, respectively, than from cropland. In 1995, SRP export from cropland was 3.5 times greater than from forest lands, while SRP export from the cow-calf operations averaged a 17-fold increase when compared to forested watersheds. In contrast, PP export was similar from streams draining forest and agricultural land during 1994 and 1995. Furthermore, streams draining both cropland and cow-calf operations exported up to 50-times more total IN than from streams discharging from forest land. However, the form of inorganic nitrogen differed according to agricultural land use. NO_3^- export predominated from cropland, while NH_4^+ was the main form of inorganic nitrogen exported in streams draining cow-calf operations. Although P and N export were generally greater from agricultural than forested watersheds, variation in stream discharge and runoff among watersheds and between years decreased the contrast in nutrient export between agricultural and forested watersheds (Table 3).

Generally, TP export and total discharge was less in 1995 than in 1994 from all watersheds. Specifically, TP export from F2 in 1995 was one-quarter the TP export in

Table 2: Total volume (m^3) discharged and depth of runoff (mm) in the agricultural (A) and forested (F) watersheds in 1994 (spring runoff estimated) and 1995.

Watershed	**1994**		**1995**	
	Total Volume (m^3)	**Depth of Runoff (mm)**	**Total Volume (m^3)**	**Depth of Runoff (mm)**
F1	5 885 807	103	2 653 579	46
F2	7 695 455	128	1 511 441	25
A1	189 426	49	117 809	31
A2	444 797	67	263 436	39

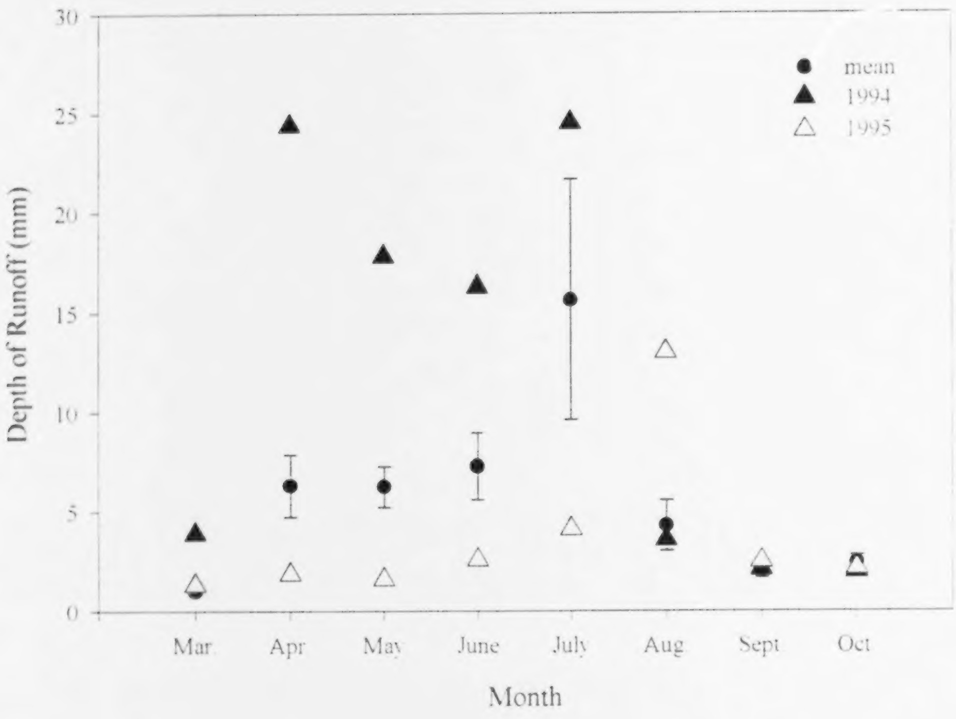

FIGURE 4: Comparison between 1994 and 1995 monthly runoff (mm) and the 13 year (1980-1993) mean monthly runoff (mm) (± SE) at the Water Survey of Canada (WSC) stream gauging station located 500m downstream of study sampling site on watershed F1 (Data from WSC, Environment Canada, 1980-1995).

Table 3: Export coefficients, expressed as mass per unit area of watershed per year (kg km^{-2} yr^{-1}), for total phosphorus (TP), total dissolved phosphorus (TDP), particulate phosphorus (PP), soluble reactive phosphorus (SRP), nitrate (NO_3^-) and ammonium (NH_4^+) for the 1994 and 1995 sampling season from the agricultural (A) and forested (F) watersheds.

Watershed	**Export Coefficients (kg km^{-2} yr^{-1})**								
	1994			1995					
	TP	TDP	PP	TP	TDP	PP	SRP	NO_3^-	NH_4^+
Forested (Undisturbed)									
F1	13	6.5	6.5	9	3	6	2	3	1
F2	22	11	11	5	2	3	2	1	1
Agricultural (Disturbed)									
A1	14	11	3	12	8	4	7	29	2
A2 site 1	82	75	7	57	51	6	51	4	158
A2 site 2	57	49	6	34	30	4	18	8	40

1994. The decrease in TP export corresponded to similar decrease in total discharge. Likewise, there was a corresponding (65%) decrease in TP and total discharge from the watershed draining the cow-calf operations (A2). Although the total volume of water discharged from cropland (A1) and forest land (F1) decreased in 1995 when compared to 1994, the TP export remained relatively consistent between sampling years.

There were no relationships between discharge and stream TP, TDP or PP concentrations during 1994 for any watershed. During 1995, however, PP concentrations were positively correlated with discharge in streams draining cropland (A1) and forested (F1) watersheds (r=0.70 and r=0.65, respectively), yet no relationships were found between TP or TDP concentrations and discharge for any of the study streams.

P and N Dynamics

Annual P and N FWMC were higher in stream water draining agricultural watersheds than in stream water discharging from forested watersheds. On average, there was a 4-, 8- and 10-fold increase in TP, TDP and SRP annual FWMC, respectively, from agricultural watersheds when compared to forested watersheds. In contrast, annual FWMC of PP were similar among all watersheds. NO_3^- annual FWMC were, on average, 10 times greater in water draining cropland than from forest land, while NH_4^+ annual FWMC were up to 20 times greater in stream water draining cow-calf operations (Table 4). Thus, streams draining land used for raising cattle had the highest P and N concentrations.

Stream monthly FWMC of TP, TDP, and PP were similar between the 1994 and 1995 sampling season (all tests: $P>0.05$; t-test). At all sampling sites within both agricultural watersheds, stream water contained higher TP, TDP and SRP concentrations than in streams draining forested watersheds (all tests: $P<0.001$; ANOVA). Water samples from the sampling site downstream of the more intensive cow-calf operation (A2-site 1) had consistently higher TP and TDP FWMC than stream water draining the less intensive cow-calf operation (A2-site 2), forest or cropland. TP and TDP concentrations in stream water draining the less intensive cow-calf operation and cropland were similar. Likewise, TP concentrations were similar in the streams draining

Table 4: Annual flow weighted mean concentrations (µg L^{-1}) for total phosphorus (TP), total dissolved phosphorus (TDP), particulate phosphorus (PP), soluble reactive phosphorus (SRP), nitrate (NO_3^-) and ammonium (NH_4^+) for the 1994 and 1995 sampling season. Flow weighted mean concentrations for the 1994 field season do not include spring runoff.

Watershed	Year	Annual Flow Weighted Mean Concentration (µg L^{-1})					
		TP	TDP	PP	SRP	NO_3^-	NH_4^+
F1	1994	123	62	61	---	---	---
	1995	187	50	137	38	65	30
F2	1994	170	81	89	---	---	---
	1995	198	93	105	74	34	39
A1	1994	434	351	83	---	---	---
	1995	396	275	121	229	968	49
A2 site 1	1995	702	637	65	---	---	---
	1994	1 119	994	125	993	151	2 359
A2 site 2	1994	464	389	45	---	---	---
	1995	839	737	102	436	196	979

both forested watersheds; however, TDP concentrations were higher in stream water discharging from F2 than from F1. In both agricultural watersheds, regardless of agricultural land use, stream SRP concentrations were similar yet greater than in stream water draining the forested watersheds. Furthermore, stream SRP concentrations in both forested watersheds were statistically similar. In contrast, stream PP concentrations were similar among all watersheds (P=0.08; ANOVA) (Figure 5). Concentrations of dissolved P fractions (TDP and SRP) in stream water draining agricultural land were consistently higher than forest land.

The concentration of TDP in stream water was consistently greater than PP concentrations during spring runoff in all watersheds. Furthermore, stream TDP concentrations increased with time following rainfall events in the agricultural and forested watersheds, whereas peak PP concentrations only corresponded with peaks in discharge from rainfall runoff (Figure 6a, b, c, d). Lateral subsurface flow may contribute to high stream TDP concentrations following rainfall events or spring runoff.

Although stream water draining cow-calf operations had consistently higher stream P concentrations than cropland, the composition of TP was similar between agricultural watersheds. On average, 83% of the TP in streams draining the agricultural watersheds was dissolved. Specifically, TDP comprised 75% of the TP pool in the stream draining cropland, while TDP comprised 90% of the TP pool in the stream draining the cow-calf operations. In contrast, TDP made up from 36 to 47% of the TP pool in streams discharging from forest land. Even though stream water in the agricultural watersheds contained higher TDP concentrations than stream water draining forest land, the proportion of SRP of the TDP pool was similar. On average, 78 and 81% of the stream TDP pool was present as SRP in the forested and agricultural watersheds, respectively (Figure 7). Consequently, most of the P in streams draining the agricultural watersheds was not in the particulate form which may suggest a large amount of subsurface runoff from cropland or direct runoff of livestock wastes from the cow-calf operations.

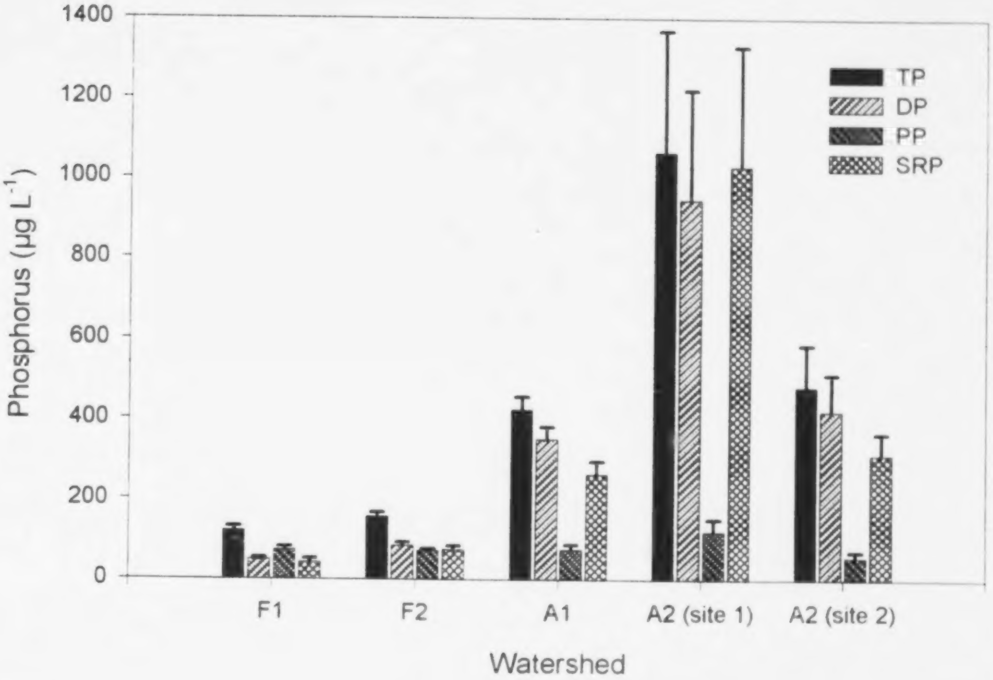

FIGURE 5: Average monthly flow weighted mean concentrations (μg L^{-1}) (± SE) for total phosphorus (TP), total dissolved phosphorus (DP), particulate phosphorus (PP) (>0.45-μm) and soluble reactive phosphorus (SRP) in streams draining the forested (F1 and F2) and agricultural (A1 and A2, site 1 and 2) watersheds.

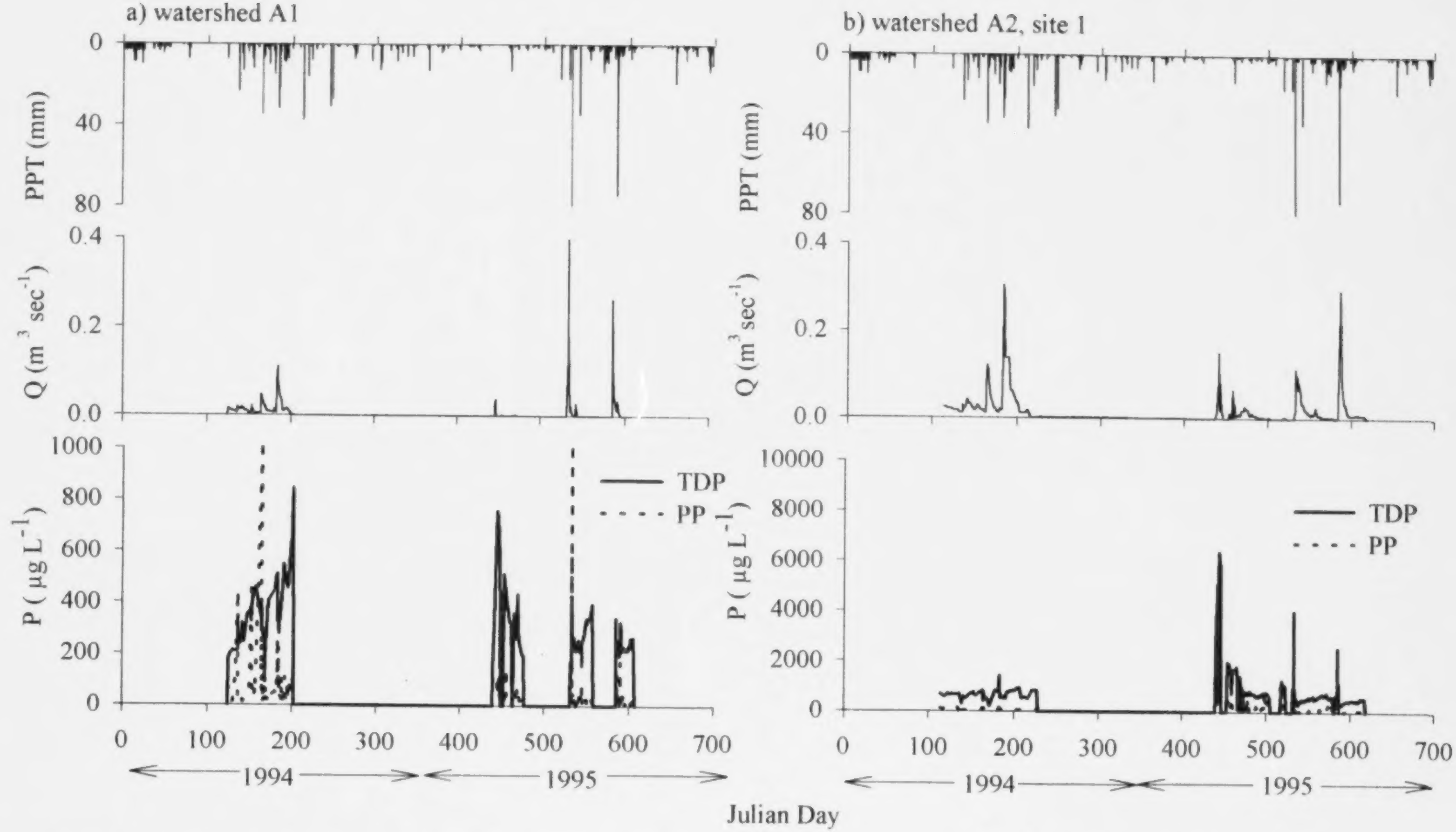

Figure 6 a; b: Variation in precipitation (PPT) (mm), discharge (Q) (m^{3}sec^{-1}), total dissolved phosphorus (TDP) (µ g L^{-1}) and particulate phosphorus (PP) (µ g L^{-1}) for the agricultural watersheds draining cropland (A1) (a) and the cow-calf operations (A2, site 1) (b) (note differences in Y-axis).

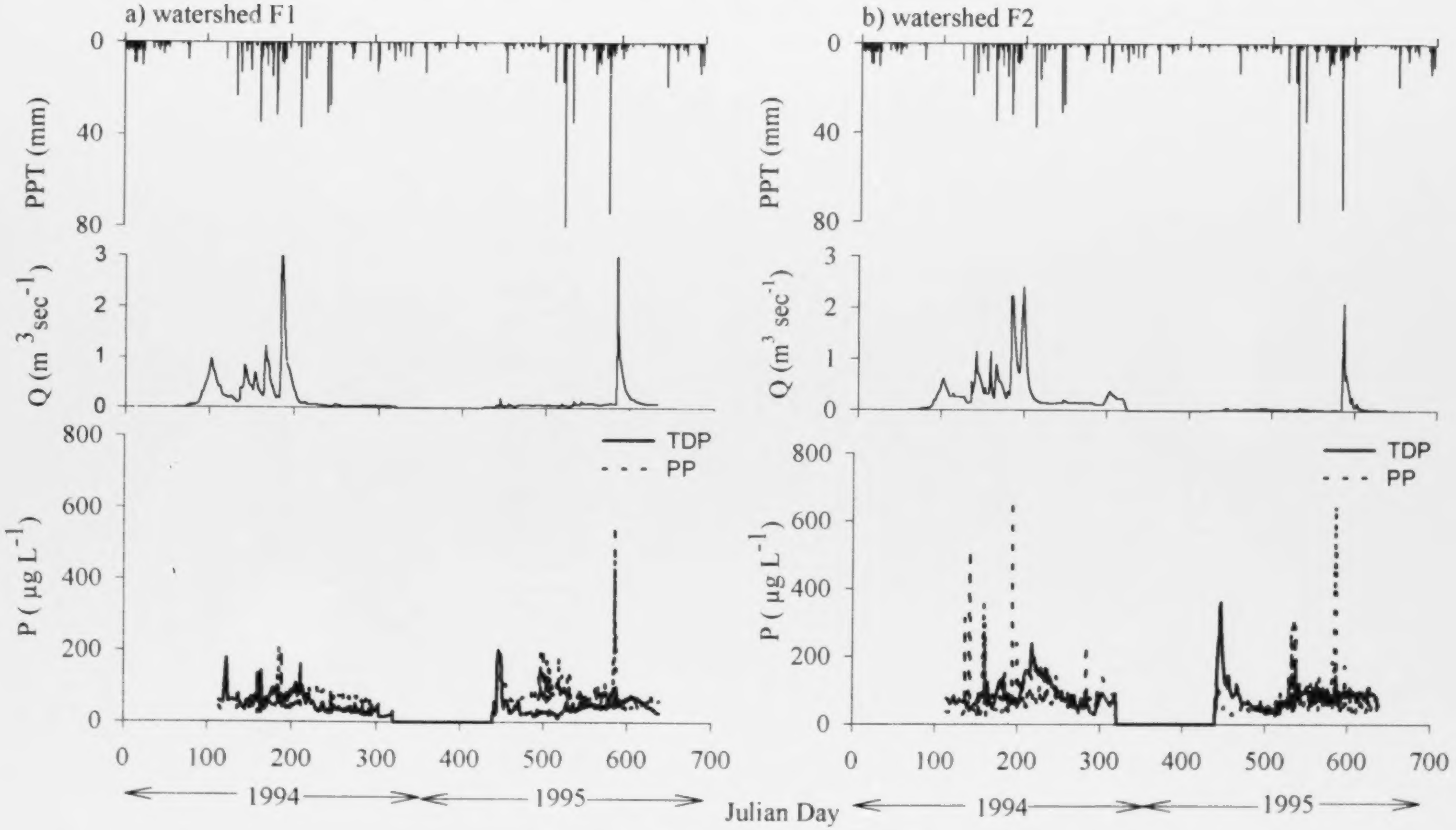

Figure 6 c; d: Variation in precipitation (PPT) (mm), discharge (Q) ($m^3 sec^{-1}$), total dissolved phosphorus (TDP) (μ g L^{-1}) and particulate phosphorus (PP) (μ g L^{-1}) for the aspen-dominated forest watersheds F1 (c) and F2 (d).

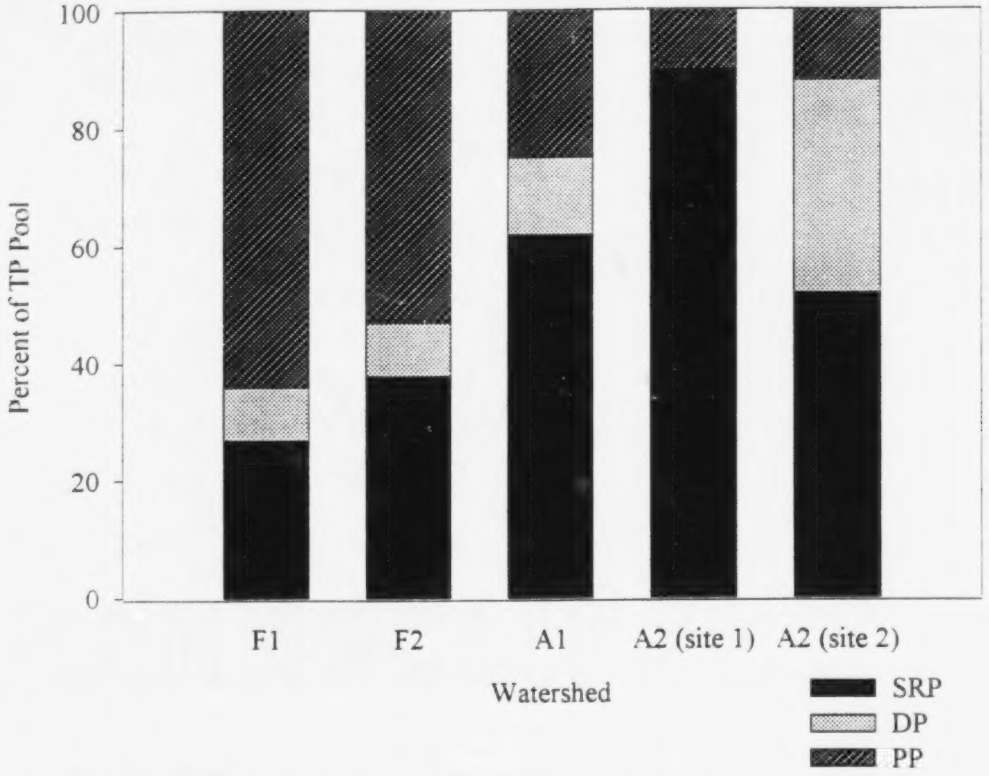

FIGURE 7: Percentage of soluble reactive phosphorus (SRP), total dissolved phosphorus (DP) and particulate phosphorus (PP) of the total phosphorus pool in streams draining the forested (F1 and F2) and agricultural (A1 and A2, site 1 and 2) watersheds.

Inorganic N concentrations were highly variable in stream water draining both agricultural watersheds with extremely high concentrations obtained in spring runoff. During spring runoff, peak stream NO_3^- concentrations approached 10 mg L^{-1} from cropland, whereas peak NH_4^+ concentrations exceeded 27 mg L^{-1} in stream water draining the watershed with two cow-calf operations. In contrast, peak concentrations of total IN (NO_3^- and NH_4^+) in stream water draining forest land were below 1 mg L^{-1} in spring runoff. Stream water draining cropland contained higher NO_3^- concentrations ($P < 0.01$) than either the streams discharging from forest land or the cow-calf operations (A2-site 1, 2). Stream water draining the more intensive cow-calf operation (A2-site 1) had higher NH_4^+ concentrations than either stream discharging from the forested watersheds, yet were similar to NH_4^+ concentrations in stream water draining both the less intensive cow-calf operation (A2-site 2) and cropland (A1) (Figure 8). Furthermore, concentrations of total IN were higher ($P<0.05$) in stream water draining cropland than in streams draining watersheds with forest land or the less intensive cow-calf operation (A2-site 2) but were similar to the more intensive cow-calf operation (A2-site 1). Therefore, stream N concentrations were higher, yet more variable, in streams draining agricultural than forested watersheds.

Even though both agricultural watersheds had high stream total IN concentrations, the composition of total IN differed. In the stream draining cropland, NO_3^- composed 98% of the total IN pool, whereas NH_4^+ made up 89% of the total IN pool in the stream discharging from the cow-calf operations. In streams draining forested watersheds, however, NO_3^- predominated, composing approximately 57% of the total IN pool (Figure 9). Thus, agricultural land use influenced the speciation of IN.

Seasonal Patterns of P and N Loading

Runoff from rainfall, compared to snowmelt generated runoff, contributed greater nutrient loads to streams draining both cropland and forest land; however, most of the nutrient load from cow-calf operations was delivered in spring runoff. In streams draining forest land, rainfall runoff supplied 50 and 74% of the total NH_4^+ and TP load, respectively, in approximately 61% of the total runoff volume, whereas one-third of the

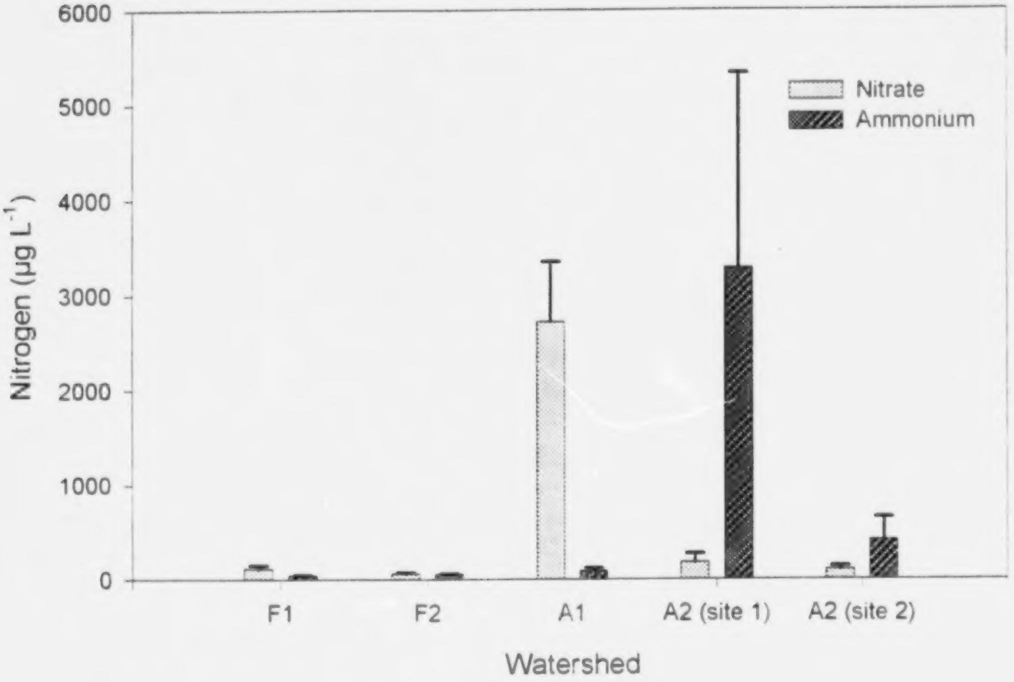

FIGURE 8: Average monthly flow weighted mean concentrations ($\mu g\ L^{-1}$) (± SE) for nitrate and ammonium in streams draining the forested (F1 and F2) and agricultural (A1 and A2, site 1 and 2) watersheds.

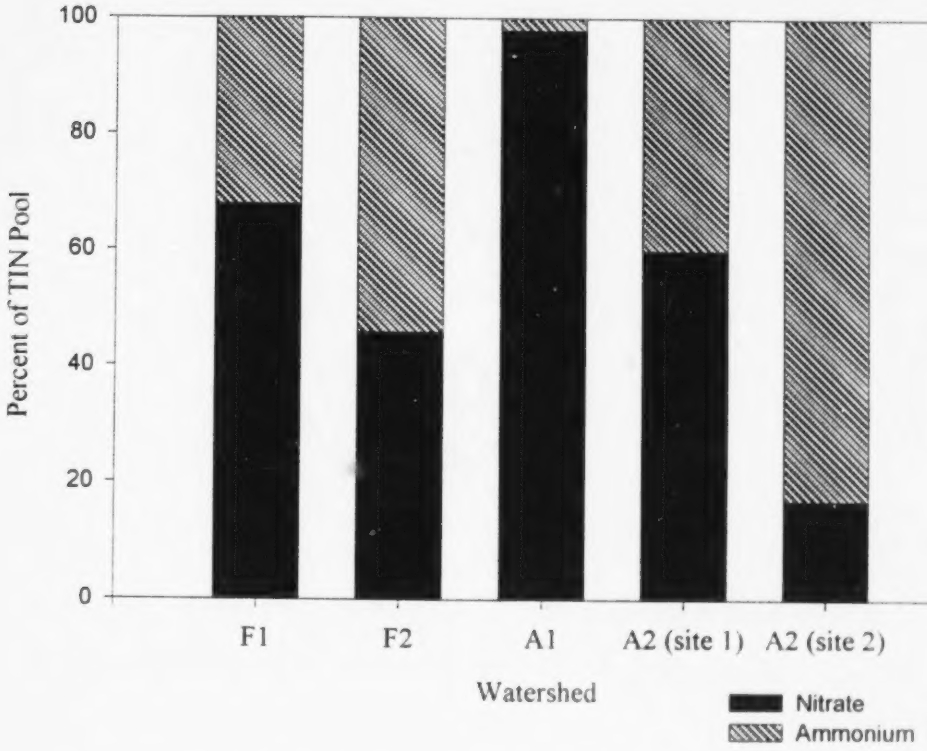

FIGURE 9: Percentage of nitrate (NO_3^-) and ammonium (NH_4^+) of the total inorganic nitrogen pool in streams draining the forested (F1 and F2) and agricultural (A1 and A2, site 1 and 2) watersheds.

total NO_3^- load was delivered in baseflow. Similarly, runoff from rainfall supplied 93% of the total runoff volume and contributed 65, 91, and 96% of the total NO_3^-, TP, and NH_4^+ load, respectively, from cropland. In the watershed with cow-calf operations, however, spring runoff supplied 75, 83, and 97% of the total TP, NO_3^- and NH_4^+ load, respectively, in less than 50% of the total runoff volume (Figure 10). Therefore, agricultural land use influenced the seasonal delivery of nutrients to surface waters.

DISCUSSION

TP export was greatest from the watershed with the cow-calf operations. Cropland and forest land, however, yielded similar TP export. There was, on average, a four-fold increase in TP export from the watershed with the cow-calf operations than from forested watersheds. These findings are generally consistent with studies that identify greater TP export from land used for cattle production than from forested or undisturbed lands. For example, TP export from forested watersheds that included pastureland (11.0 and 28.8 mg $m^{-2}yr^{-1}$ overlying igneous and sedimentary bedrock, respectively) was 2-fold higher than from exclusively forested watersheds (4.8 and 10.7 mg $m^{-2}yr^{-1}$ overlying igneous and sedimentary bedrock, respectively) (Dillon and Kirchner 1975). Furthermore, TP export from watersheds overlying sedimentary formations and used solely for agriculture averaged 46 kg $km^{-2}yr^{-1}$ (Dillon and Kirchner 1975). This is comparable to the two year average TP export from the watershed with the cow-calf operations (53 kg $km^{-2}yr^{-1}$). High TP export from the watershed with the cow-calf operations is likely attributable to direct runoff from livestock waste.

TDP export was consistently greater from cropland and cow-calf operations (1.6- and 9-times, respectively) than from forest land. Likewise, SRP export was greater in the agricultural than forested watersheds (Table 3). TDP and SRP export exceeded PP export from both agricultural watersheds. Studies from the Atlantic coastal plain and southern Ontario, however, state that PP export (> 0.45-µm) predominates from agricultural and forested watersheds (Vaithiyanathan and Correll 1992; Ng et al. 1993) and can account for 75 to 90% of the TP export (Prairie and Kalff 1986; Sharpley et al. 1991; Ng et al. 1993). SRP export from 10 agricultural watersheds in southern Ontario composes, on

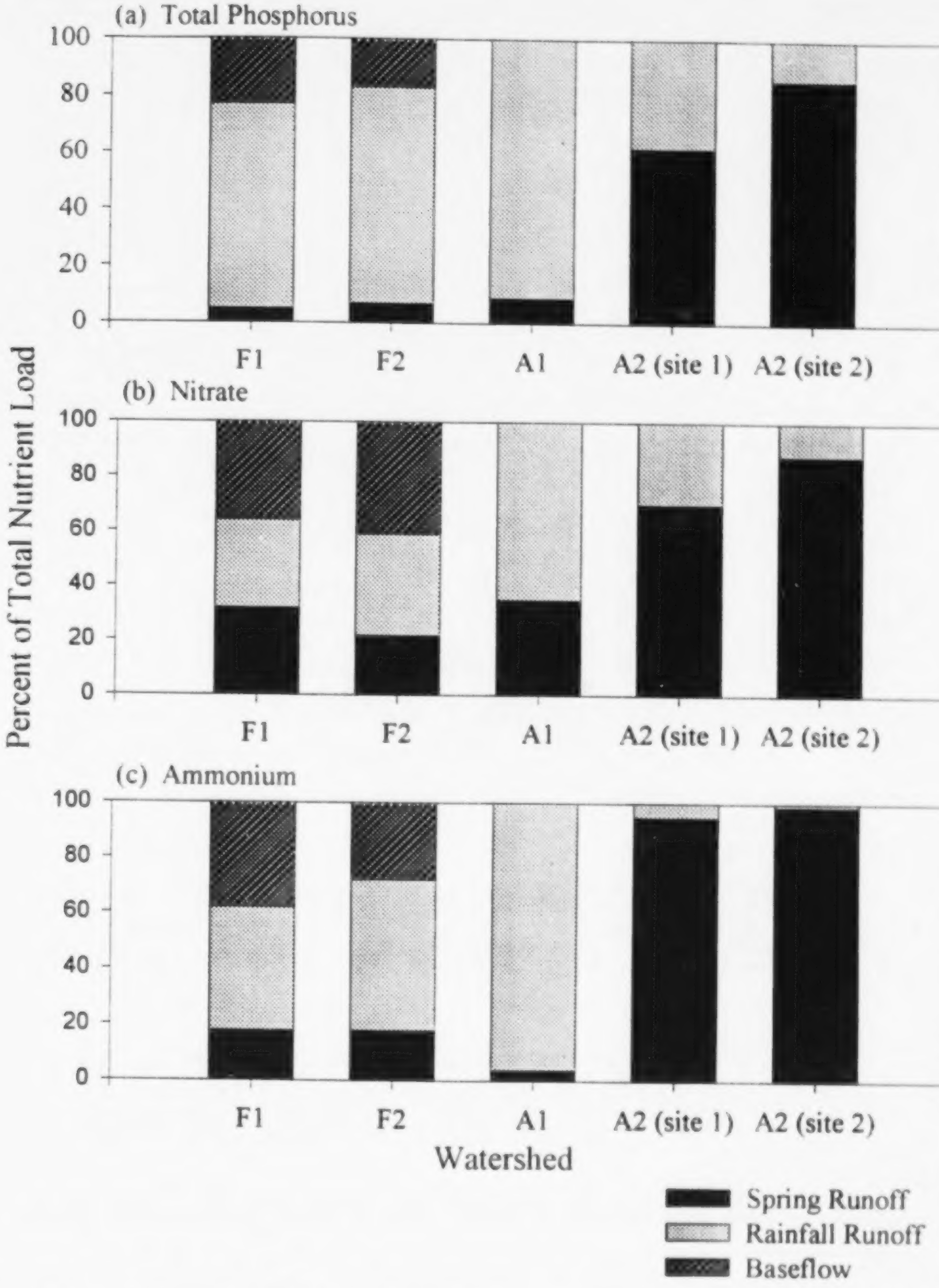

FIGURE 10: Percentage of the (a) total phosphorus, (b) nitrate and (c) ammonium load of the corresponding total nutrient load transported in spring runoff, rainfall runoff and baseflow in streams draining the forested (F1 and F2) and agricultural (A1 and A2, site 1 and 2) watersheds.

average, only 20 to 30% of the TP load (Miller et al. 1982). Further, the proportion of SRP of the TP export is generally small (< 50%) from agricultural watersheds (Omernik 1977; Coote et al. 1982; Clesceri et al. 1986). On the boreal plain, most (73 to 89%) of the P export from the agricultural watersheds was in the dissolved fraction, while SRP export comprised 58 to 76% of the TP export from the agricultural watersheds. Since SRP approximates biologically available P, the proportion of SRP found in stream water draining both non-row cropland and cow-calf operations was comparable to the proportion of bioavailable P found in municipal sewage effluent (approximately 70% is biologically available (DePinto et al. 1980)). Similarly, a high proportion (80 to 95%) of the TP pool was TDP with 70 to 85% measured as orthophosphorus (SRP) in Stoney Creek, a tributary of the Assiniboine River, Saskatchewan (Neil 1992). Soils of the interior plains, which includes most of the Canadian prairie provinces, contain montmorillonite clay which possesses an overall negative charge and exhibits greater anion repulsion (Canadian Soil Survey Committee 1978; Bohn et al 1986). Since the predominant dissolved phosphate species in runoff with circum-neutral pH are HPO_4^{2-} and $H_2PO_4^-$ anions (Ng et al. 1993), P in runoff on the boreal plain would tend to remain in the dissolved fraction as anion repulsion would prevent the adsorption of P onto suspended clay particles and be transported as PP. Therefore, the disporportionately high export of TDP and SRP is likely a result of the mineralogical composition of local soils on the boreal plain.

Total IN export from agricultural watersheds exceeded, by an order of magnitude, total IN export from aspen-dominated forested watersheds. The speciation of N, however, differed according to agricultural land use. NO_3^- was the dominant N species from cropland, while NH_4^+ predominated from the watershed with the cow-calf operations. NO_3^- was the predominant form of total IN exported from aspen-dominated forested catchments. Chemical fertilizers applied to cropland likely influenced the speciation and export of NO_3^-, whereas the export of NH_4^+ from the watershed housing the cow-calf operations was likely influenced by livestock waste.

High total IN loads from the agricultural watersheds on the boreal plain are consistent with findings from other agricultural watersheds (e.g. Hill 1978; Coote et al. 1982). However, NO_3^- export from non-row cropland is one to two orders of magnitude lower than from agricultural watersheds in the Great Lakes region. Heavy use of N fertilizers and manure on cropland are thought to contribute to the extremely high NO_3^- export in the Great Lakes region (Neilsen and MacKenzie 1977; Hill 1978). Generally, N and P fertilizers are applied on cropland to increase crop yield. N fertilizers convert to NH_4^+, a more stable form of N, in the soil. Over time, NH_4^+ is oxidized to NO_3^- which can leach through the soil profile (Clay et al. 1994). Leaching and subsurface transport of NO_3^- contribute high NO_3^- concentrations in the Raccoon River, Iowa (Lucey and Goolsby 1993). Thus, high NO_3^- export from non-row cropland on the boreal plain suggests that NO_3^- was being leached from the soil and transported by subsurface flow. The prence of oxygen in the soil profile of arable land likely facilitates the conversion of inoragnic fertilizers (e.g. anhydrous ammonia) to NO_3^-. Thus, explaining the high export of NO_3^- from non-row cropland. In contrast, NH_4^+ export predominated from the cow-calf operations. NH_4^+ can resist leaching as it is adsorbed onto soil and organic particles (Clay et al. 1994). Thus, high NH_4^+ export suggests that N was exported in overland runoff rather than subsurface flow. Furthermore, low dissolved oxygen concentrations likely found in intermittent streams, would minimize the oxidation of NH_4^+ to NO_3^-. Since NH_4^+ is the form of N that is directly available for primary production, cow-calf operations would be a direct source of IN for downstream algal growth.

TP export from agricultural land on the boreal plain was comparable to low intensive agricultural practices conducted in southern Ontario, while SRP and NH_4^+ export was similar to more intensive agricultural practices (i.e. row-crops, high fertilizer application rates, high livestock densities) (Table 5). Cropland on the boreal plain, consisted of non-row cereal or oilseed crops, N and P fertilization rates averaged 47.8 and 22.7 kg ha^{-1}, respectively, and livestock densities ranged from 0.06 animal units ha^{-1} for the less intensive cow-calf operation (A2-site 2) and 0.33 animal units ha^{-1} for the more intensive cow-calf operation (A2-site 1). Fertilization rates and livestock densities for the

Table 5: Average export coefficients (kg km^{-2}yr^{-1}) and flow weighted mean concentrations (FWMC) (µg L^{-1}) of total phosphorus (TP), soluble reactive P (SRP), nitrate (NO_3^-) and ammonium (NH_4^+) from low and high intensity agriculture in southern Ontario. Adapted from Coote et al. (1982)

	Low Intensity Agriculture		High Intensity Agriculture	
	Export kg km^{-2}yr^{-1}	FWMC µg L^{-1}	Export kg km^{-2}yr^{-1}	FWMC µg L^{-1}
TP	40	80	103	318
SRP	10	21	32	95
NO_3^-	450	960	2 085	5 850
NH_4^+	20	40	79	247

more intensive cow-calf operations were comparable to the more intensive agricultural land in southern Ontario (e.g., Coote et al. 1982). However, TP export from the cow-calf operations and cropland were similar to well below the TP export from low intensive agriculture, respectively, in the Great Lakes region. Stream TP FWMC in both agricultural watersheds on the boreal plain were comparable to the high intensive agricultural watersheds in the Great Lakes region. Further, NO_3^- concentrations in streams draining non-row cropland and cow-calf operations were well below the concentrations found in streams draining low intensive agriculture in the Great Lakes region. The extensive use of subsurface tile drainage would account for the large NO_3^- export in the southern Great Lakes region (Neilsen et al. 1982; Baker 1993). NH_4^+ and SRP stream FWMC and export from the cow-calf operations, however, were comparable to high intensive agricultural practices in southern Ontario. SRP export from cropland on the boreal plain was comparable to low intensive agricultural practices in the Great Lakes region. However, stream SRP FWMC in the cropland watershed exceeded the concentrations found in high intensive agricultural watersheds in southern Ontario. The results from this study indicate high NH_4^+ export from cow-calf operations and a disproportionately high export of SRP from both cropland and cow-calf operations on the boreal plain.

The Baptiste Lake watershed was studied in the late 1970's by Alberta Environmental Protection to assess lake trophic status and the influence of shoreline/watershed development on lake trophic status (Trew et al. 1987). However, inappropriate laboratory methodologies preclude the use of the nutrient data from this study. For instance, except for the watershed with the cow-calf operations, TP export was consistently greater in 1978 than in 1994-95 even though the average runoff from the four watersheds in 1978 (90 mm) was similar to 1994 (87 mm). Nonetheless, some comparisons can be made between stream flow and runoff. Stream flow in both agricultural watersheds was sustained throughout the growing season in 1978, whereas streamflow occurred only during spring melt and storm events in 1994-95. The study conducted in 1978 occurred following a series of years with average to above average precipitation (Figure 3). The water table and soil moisture may have been higher, thus maintaining streamflow in the cropland watershed. In contrast, the present study followed a series of years of average to below average precipitation. Soil moisture and the water table may have been low, thus unable to sustain continuous streamflow. Since streamflow on the boreal plain is strongly influenced by hydrologic characteristics, nutrient export from agricultural lands should be quantified during both wet and dry cycles.

The measurement of biologically available P in agricultural runoff is recommended to more reliably evaluate the impact of agriculture on the biological productivity of surface waters (Sharpley and Smith 1993). TDP was found to be the most useful correlate of bioavailable P in eutrophic lakes and rivers when TDP concentrations were greater than 30 $\mu g\ L^{-1}$ (Bradford and Peters 1987). High concentrations of TDP in streams draining both cropland and cow-calf operations (311 and 816 $\mu g\ L^{-1}$, respectively) suggest high P bioavailability. TDP concentrations in streams draining forest land, however, were also greater than 30 $\mu g\ L^{-1}$ (average 72 $\mu g\ L^{-1}$). This suggests that stream TDP concentrations in undisturbed areas (i.e., forested) are naturally high and can contribute biologically available P to surface waters. TDP concentrations in streams draining both agricultural watersheds, however, were more than four times greater than forested watersheds. Therefore, agricultural land contributes greater quantities of biologically available P, as measured as SRP, to downstream lakes and rivers.

Although the streams draining the aspen-dominated forested watersheds had naturally high TDP concentrations, they also contained relatively high PP concentrations (average 98 $\mu g\ L^{-1}$). Xaio et al. (1990) found that the P content of the forest floor is highest under aspen, due to the large amounts of forest litter, somewhat less under mixed-wood and lowest under a coniferous forests. Relatively little contribution of coarse PP (>1mm) to TP export and very low fine PP (0.45-1mm) concentrations were found in streams draining two coniferous-dominated forested watersheds in central Alberta (Munn and Prepas 1986). The large supply of leaf litter in the aspen-dominated forested watersheds likely enhanced stream PP concentrations.

Catchment topography, specifically slope, has been related to water quality in streams and lakes (e.g., Dillon et al. 1991; D'Arcy and Carignan 1996). Generally, topography on the boreal plain is gently sloping (4%) and water drainage from the soil is slow in relation to supply due to low perviousness, shallow water table, or lack of gradient (Shields et al. 1991). Such topographic characteristics likely influenced the transport of P and N from land to stream on the boreal plain. TDP concentrations progressively increased during the falling limb of the hydrograph following storm events in both forested and agricultural watersheds (Figure 6). Higher concentrations of TDP during the latter part of storm events was also found by Ng et al. (1993) in an agricultural watershed in southern Ontario and Longabucco and Rafferty (1989) in a cultivated muckland in New York State. High stream TDP concentrations are attributed to longer leaching time available for soil P, an increased depth of interaction between surface soil and runoff (Sharpley and Smith 1989), a greater influence associated with groundwater runoff and delayed subsurface drainage than with surface runoff (Longabucco and Rafftery 1989). Because of the gently sloping terrain in the forested and agricultural watersheds on the boreal plain, subsurface flow is likely to contribute to the high concentrations of dissolved nutrients (i.e., TDP, SRP and NO_3^-) in storm runoff, particularly from crop and forest land.

TP export is expressed on a per unit area basis to allow comparison of watersheds of different sizes. This assumes that TP export is a linear function of watershed area (Prairie and Kalff 1986). Watershed size, however, has been shown to influence TP export from various land uses. For example, streams in small catchements, specifically with pasture and row-crops, deliver more P associated with sediment which would explain the scale effect observed in TP export from different sized catchments (Prairie and Kalff 1986; Bolton and Ward 1993). However, non-row crop, mixed-agriculture or forested catchments can be compared directly with average P export coefficients (Prairie and Kalff 1986). Although the watersheds in this study are of varying size, the agricultural land uses (i.e., non-row crop, mixed agriculture and forested) and the predominance of TDP export from the agricultural watersheds suggests that comparisons of TP export can be made on a per unit area basis.

In addition to watershed slope, the structure, texture and type of soil can influence the delivery of nutrients from a watershed (Omernik 1977; Kauppi 1985; Sharpley and Menzel 1987). The leaching of nutrients in Gray Luvisolic soils is an important mechanism for P flux and removal in northern boreal forest ecosystems (Frossard et al. 1989; Donald et al. 1993). For example, a lateral redistribution of soil P from upland profiles to low lying areas was found by Donald et al. (1993). The redistribution of P toward low lying areas was likely responsible for the movement of P to streams on the boreal plain and contribute to naturally high stream P concentrations in the forested watersheds (average 170 μg TP L^{-1}). In addition, large P losses are reported from Gray Luvisolic soils in the boreal ecoregion when compared to Spodosolic soils of the Hubbard Brook Experimental Forest in New Hampshire (Xaio et al. 1991). This corresponds with low TDP concentrations found in Bear Brook (2 μg TDP L^{-1}) located in the Hubbard Brook Experimental Forest (Meyer and Likens 1979) and high stream TDP concentrations found in the aspen-dominated forested watersheds (average 72 μg TDP L^{-1}) on the boreal plain. Further, high stream P concentrations were probably from the high percentage (35% of the total watershed area) of organic soils found in the forested watersheds. Soils with higher organic matter content contain higher concentrations of soluble P in runoff (Ng et al. 1993). Consistently high stream P concentrations was likely from a combination of gently sloping terrain, high P flux from Gray Luvisol soils and a significant percentage of organic soils found in the forested watersheds.

Variation in P export is related to changes in stream discharge (Sharpley and Menzel 1987; Vaithiyanathan and Correll 1992). For instance, lower discharge from agricultural watersheds when compared to non-agricultural watersheds tends to reduce the contrast in nutrient loads (Hill 1978). Total discharge from the forested watersheds was over an order of magnitude greater than from agricultural watersheds. Further, the streams draining the agricultural watersheds were intermittent. However, nutrient loading from the agricultural watersheds generally exceeded those from forested watersheds.

Greater nutrient export from agricultural watersheds could be attributed to higher nutrient concentrations plus a greater sensitivity to the timing and magnitude of precipitation in determining runoff and loading (Soranno et al. 1995). Nutrient export from one of the forested watershed (i.e., F2), however, was more variable between study years. Less runoff (figure 4) and precipitation likely reduced total nutrient load in 1995 as nutrient transport in surface runoff is related to runoff volume (Sharpley and Menzel 1987). In addition, streams draining the forested catchments were regulated by numerous beaver dams (>10) that also influenced total runoff volume and nutrient load. For instance, during the fall of 1994, a large beaver dam was blown out 500 m upstream of the sampling site in F2. Consequently, there was a corresponding 5-fold reduction in runoff volume and TP export from the forested watershed in 1995, likely a result of a new beaver pond filling upstream. Beaver ponds have been suggested as a source of high TP export from forested catchments located in the Great Lakes-St. Lawrence region (Dillon et al. 1991). However, there was no difference in stream TP concentrations between 1994 and 1995. Therefore, the reduction of runoff volume was likely responsible for the reduction of TP load between sampling years. Thus, there is an interdependence between runoff volume and nutrient export from watersheds on the boreal plain.

Differences between relationships of nutrient export to land use may be found in differences in mean annual precipitation (Omernik 1977). On the boreal plain, however, TP export from forested watersheds overlying sedimentary bedrock (average 12 kg TP km^{-2}yr^{-1}) was comparable to TP export from similar mixed hardwood forested watersheds in the Great Lakes-St. Lawrence region (e.g., 10.7 kg TP km^{-2}yr^{-1}, Dillon and Kirchner 1975) even though the boreal plain received 1.5 to 2 times less annual precipitation. High TP concentrations combined with lower stream discharges produced similar TP export from streams draining aspen-dominated forested watersheds to streams draining mixed hardwood forests. Thus, less annual precipitation that contributes to stream flow may not infer less annual nutrient export.

Most of the total runoff from cropland and forest land was the result of rainfall events. In contrast, snowmelt was found to account for > 85% of the total runoff volume from cereal cropland in southern Saskatchewan (Nicholaichuk 1967). Rainfall events contributed most of the TP, NO_3^- and NH_4^+ loads (91, 65 and 96% respectively) to the stream draining cropland. Similarly, rainfall runoff contributed most of the TP and NH_4^+ loads from forest land, while 41% of the NO_3^- load was delivered through groundwater that maintained baseflow. Similarly, a low winter snowpack found in central Alberta watersheds reduced the importance of nutrient pulses associated with spring runoff from forest land relative to rainfall events (Munn and Prepas 1986). Conversely, spring runoff transported most of the TP, NO_3^- and NH_4^+ loads (62, 70, 95%, respectively) from the watershed that drained the cow-calf operations, while only contributing 31% of the total runoff volume. Manure build up over the winter from the cow-calf operations likely contributed to the high nutrient loads, specifically TDP (Schepers and Francis 1982), in spring runoff. The length of time between summer storm events would also influence the quantity of nutrients exported from the watershed draining the cow-calf operations as manure would accumulate between storm events. Thus, both rainfall and spring runoff strongly influence nutrient loading from agricultural land on the boreal plain. Land and livestock waste management measures to reduce nutrient loads to surface waters should be conducted during spring runoff for cattle husbandry operations, while nutrient management strategies (i.e., soil nutrient testing, modified fertilizer application rates) as well as erosion control measures must be employed on cropland during the growing season to reduce total nutrient loads from storm events.

Other land uses such as forest harvesting on the boreal plain are likely to increase nutrient loads to surface waters. For example, increased logging activity in the Sakwatamau River watershed may have contributed to higher instantaneous TP concentrations during spring runoff. Instantaneous peak TP concentration during spring runoff in 1983 was 57 $\mu g\ L^{-1}$ (Munn and Prepas 1986), whereas instantaneous peak TP concentration during 1995 spring runoff was 141$\mu g\ L^{-1}$(Water Sciences Branch, Alberta Environmental Protection, unpublished data), almost 2.5 times higher than in 1983. In contrast, instantaneous peak TP concentrations during peaks in discharge from rainfall were comparable at 225 and 235 $\mu g\ L^{-1}$ for 1983 and 1995, respectively. Forest harvesting was conducted within 4 of the 10 townships than encompassed the Sakwatamau River watershed prior to 1983, whereas 8 of the 10 townships incurred some logging activities prior to 1995. Thus, increased over winter logging activities within the Sakwatamau River watershed probably increased TP concentrations during spring runoff.

Agriculture on the boreal plain can affect surface water quality with increased P and N loads. For instance, all samples taken from the streams draining both cropland and cow-calf operations exceeded the Alberta Surface Water Interim Guidelines of 150µg TP L^{-1}. In contrast, only 23% of the samples exceeded 150µg TP L^{-1} in the streams draining forest land. As the boreal plain ecosystem is under increasing pressure, future research is required to clearly define the impact of other land uses, including forest harvesting, on surface water quality.

REFERENCES CITED:

ALBERTA ENVIRONMENTAL PROTECTION. 1994. Water supply outlook for Alberta. February 1994. Alberta Environmental Protection, Edmonton, Alberta, Canada. 14p.

BAKER, D.B. 1993. The Lake Eire Agroecosystem Program: water quality assessments. Agric. Ecosyst. Environ. 46:197-215.

BOHN, H.L., B.L. MCNEAL, AND G.A. O'CONNOR. 1985. Soil Chemistry. 2nd ed. John Wiley & Sons, Toronto 341 p.

BOLTON, S.M., AND T.J. WARD. 1993. Scale effects of sediment related transport of phosphorus. Wat. Sci. Tech. 28:473-481.

BOSTROM, B., G. PERSSON, AND B. BROBERG. 1988. Bioavailability of different phosphorus forms in freshwater. Hydrobiol. 170:133-155

BRADFORD, M.E. AND R.H. PETERS. 1987. The relationship between chemically analyzed phosphorus fractions and bioavailable phosphorus. Limnol. Oceanogr. 32:1124-1137.

BURWELL, R.E., G.E. SCHUMAN, R.F. PIEST, R.G. SPOMER AND T.M. MCCALLA. 1974. Quality of water discharged from two agricultural watersheds in southwestern Iowa. Water Resour. Res. 10:359-365.

Canada Soil Survey Committee. 1978. The Canadian system of soil classification. Research Branch, Canada Department of Agriculture. Publ. 1646. Hull, Quebec 164 p.

CHAMBERS, P.A., E.E. PREPAS, H.R. HAMILTON, AND M.L. BOTHWELL. 1991. Current velocity and its effect on aquatic macrophytes in flowing waters. Ecol. Appl. 1:249-257.

CLAY, D.E., S.A. CLAY, K. BRIX-DAVIS, AND K.A. SCHOLES. 1994. Nitrate movement after anhydrous ammonia application in a ridge tillage system. J. Environ. Qual. 23: 9-13.

CLESCERI, N.L., S.J. CURRAN, AND R.I. SEDLAK. 1986. Nutrient loads to Wisconsin lakes: Part I Nitrogen and phosphorus export coefficients. Water Resour. Bull. 22:983-990.

COOTE, D. R., E.M. MACDONALD, W.T. DICKINSON, R.C. OSTRY, AND R. FRANK. 1982. Agriculture and water quality in the Canadian Great Lakes Basin: I. Representative agricultural watersheds. J. Environ. Qual. 11: 473-481.

D'ARCY, P. AND R. CARIGNAN. 1996. Influence of catchment topography on water chemistry in southeastern Quebec Shield lakes. Can. J. Fish. Aquat. Sci. 53:

DEPINTO, J.V., J.K. EDZWALD, M.S. SWITZENBAUM AND T.C. YOUNG. 1980. Phosphorus removal in lower great lakes municipal treatment plants. EPA-600/2-80-177. United States Environmental Protection Agency, Cincinnati, Ohio.

DILLON, P.J., AND W.B. KIRCHNER. 1975. The effects of geology and land use on the export of phosphorus from watersheds. Wat. Res. 9:135-148.

DILLON, P.J. AND F.H. RIGLER. 1974. The phosphorus chlorophyll relationship in lakes. Limnol. Oceanogr. 19:767-773.

DILLON, P.J., AND F.H. RIGLER. 1975. A simple method for predicting the capacity of a lake for development based on lake trophic status. J. Fish. Res. Board Can. 32:1519-1531.

DILLON, P.J., L.A. MOLOT, AND W.A. SCHEIDER. 1991. Phosphorus and nitrogen export from forested stream catchments in central Ontario. J. Environ. Qual. 20: 857-864.

DONALD, R.G., D.W. ANDERSON, AND J.W.B. STEWART. 1993. Potential role of dissolved organic carbon in phosphorus transport in forested soils. Soil Sci. Soc. Am J. 57:1611-1618.

FROSSARD, E., J.W.B. STEWART, R.J. ST ARNAUD. 1989. Distibution and mobility of phosphorus in grassland and forest soils of Saskatchewan. Can. J. Soil Sci. 69:401-416.

GORDON, N.D., T.A. MACMAHON, AND B.L. FINLAYSON. 1994. Stream hydrology, an introduction for ecologists. John Wiley & Sons, Toronto, 526 p.

HILL, A.R. 1978. Factors affecting the export of nitrate-nitrogen from drainage basins in southern Ontario. Wat. Res. 12:1045-1057

JOHNSTON, N.T., C.J. PERRIN, P.A. SLANEY AND B.R. WARD. 1990. Increased juvenile salmonid growth by whole-river fertilization. Can. J. Fish. Aquat. Sci. 47:862-872.

JONES, J.R., B.P. BOROFKA, AND R.W. BACHMANN. 1976. Factors affecting nutrient loads in some Iowa streams. Water Res. 10:117-122.

KAUPPI, L. 1985. The contribution of agricultural loading to eutrophication in Finnish lakes. Wat. Sci. Tech. 17:1133-1140.

KJEARSGAARD, A.A. 1972. Soil survey of the Tawatinaw map sheet (83-I): Alberta Institute of Pedology Report No. S-72-29, University of Alberta Press, Edmonton, Alberta, Canada..

KRONVANG, B. 1992. The export of particulate matter, particulate phosphorus and dissolved phosphorus from two agricultural river basins: Implications on estimating the non-point phosphorus load. Wat. Res. 10:1347-1358.

LONGABUCCO, P., AND M.R. RAFFETY. 1989. Delivery of nonpoint-source phosphorus from cultivated mucklands to Lake Ontario. J. Environ. Qual. 18:157-163.

LUCEY, K.J., AND D.A. GOOLSBY. 1993. Effects of climatic variations over 11 years on nitrate-nitrogen concentrations in the Raccoon River, Iowa. J. Environ. Qual.

22:38-46.

MENZEL, D.W., AND N. CORWIN. 1965. The measurement of total phosphorus in seawater based on the liberation of organically bound fractions by persulfate oxidation. Limnol. Oceanogr. 10:280-282.

MEYER, J.L., AND G.E. LIKENS. 1979. Transport and transformations of phosphorus in a forest stream ecosystem. Ecology 60:1255-1269.

MILLER, M.H., J.B. ROBINSON, D.R. COOTE, A.C. SPIRES, AND D.W. DRAPER. 1982. Agriculture and water quality in the Canadian Great Lakes basin: III. Phosphorus. J. Environ. Qual. 11:487-492.

MUNN, N., AND E.E. PREPAS. 1986. Seasonal dynamics of phosphorus partitioning and export in two streams in Alberta. Can. J. Fish. Aquat. Sci. 43: 2464-2471.

MURPHY, J.H., AND J.P. RILEY. 1962. A modified single solution method for the determination of phosphorus in natural waters. Anal. Chim. Acta 27:31-36.

NATIONAL ATLAS OF CANADA. 1996. The boreal forest. Natural Resouces Canada, Canadian Forest Service, Geomatics Canada, Ottawa, Ontario.

NEIL, P.W.A. 1992. Estimating total phosphorus in a small prairie tributary. M.Sc. thesis, University of Regina, Regina Saskatchewan. 97p.

NEILSEN, G.H., AND A.F. MACKENZIE. 1977. Relationships between soluble and sediment nutrient losses, land use and types of soil in agricultural watersheds. Proc. 12th Canadian Symp. Water Pollution Research Canada p. 121-134.

NEISEN, G.H, J.L. B. CULLEY, AND D.R. CAMERON. 1982. Agriculture and water quality in the Canadian Great Lakes Basin: IV. Nitrogen. J. Environ. Qual. 11:493-496.

NORUSIS, M.J. 1993. SPSS for Windows, Base systems user's guide, Release 6.0. SPSS, Inc. 828 p.

NG, H.Y.F., T. MAYER, AND J. MARSALEK. 1993. Phosphorus transport in runoff from a small agricultural watershed. Wat. Sci. Tech. 28: 451-460.

NICHOLAICHUK, W., AND D.W.L. READ. 1978. Nutrient runoff from fertilized and unfertilized fields in western Canada. J. Environ. Qual. 7: 542-544.

OMERNIK, J.M. 1977. Nonpoint source-stream nutrient level relationships: a nationwide study. EPA-600/3-77-105. United States Environmental Protection Agency, Corvallis, Oregon, USA. 106p.

PERRIN, C.J., M.L. BOTHWELL, AND P.A. SLANEY. 1987. Experimental enrichment of a coastal stream in British Columbia: effects of organic and inorganic additions on autotrophic periphyton production. Can. J. Fish. Aquat. Sci. 44:1247-1256.

PIETILAINEN, O-P., AND S. REKOLAINEN. 1991. Dissolved reactive and total phosphorus load from agricultural and forested basins to surface waters in Finland. Aqua Fennica 21: 127-136.

PRAIRIE, Y.T., AND J. KALFF. 1986. Effect of catchment size on phosphorus export. Water Res. Bull. 22: 465-470.

PREPAS, E.E., AND F.H. RIGLER. 1982. Improvements in quantifying the phosphorus concentration in lake water. Can. J. Fish. Aquat. Sci. 39:822-829.

PREPAS, E.E. AND D.O. TREW. 1983. Evaluation of the phosphorous-chlorophyll relationship for lakes off the Precambrian Shield in western Canada. Can. J. Fish. Aquat. Sci. 40:27-35.

REEDYK, S., S.E. COOKE AND E.E. PREPAS. Design for an inexpensive continuous digital output water level recorder. Submitted to Water Resources Research.

RICHARDS, R.P., AND D.B. BAKER. 1993. Trends in nutrient and suspended sediment concentrations in Lake Eire tributaries, 1975-1990. J.Great Lakes Res. 19:200-211.

RIGLER, F.H. 1979. The export of phosphorus from dartmoor catchments: a model to explain variations of phosphorus concentrations in stream water. J. Mar. Biol. 59: 659-687.

RILEY, E.T., AND E.E. PREPAS. 1984. The role of internal phosphorus loading in two shallow, productive lakes in Alberta, Canada. Can. J. Fish. Aquat. Sci. 41: 845-855.

RYDEN, J.C., J.K. SYERS, AND R.F. HARRIS. 1973. Phosphorus in runoff and streams. Advances in Agronomy 25: 1-45.

SCHINDLER, D.W. 1977. The evolution of phosphorus limitation in lakes. Science. 195:260-262.

SCHEPERS, J.S., AND D.D. FRANCIS. 1982. Chemical water quality of runoff from grazing land in Nebraska: I. Influence of grazing livestock. J. Environ. Qual. 11:231-359

SHARPLEY, A.N., L.H. AHUJA, M. YAMAMOTO, AND R.G. MENZEL. 1981. The kinetics of phosphorus desorption from soil. Soil Sci. Soc. Am. J. 45:493-496.

SHARPLEY, A.N., S.C. CHAPRA, R. WEDEPOHL, J.T. SIMS, T.C. DANIEL, AND K.R. REDDY. 1994. Managing agricultural phosphorous from protection of surface waters: Issues and options. J. Environ. Qual. 23: 437-451.

SHARPLEY, A.N. AND R.G. MENZEL. 1987. The impact of soil and fertilizer phosphorus on the environment. Advances in Agronomy 41:297-324.

SHARPLEY, A.N., W.W. TROEGER, AND S.J. SMITH. 1991. The measurement of bioavailable phosphorus in agricultural runoff. J. Environ. Qual. 20:235-238.

SHARPLEY, A.N., AND S.J. SMITH. 1989. Prediction of soluble phosphorus transport in agricultural runoff. J.Environ. Qual. 18: 313-316.

SHARPLEY, A.N., S.J. SMITH, O.R. JONES, W.A. BERG, AND G.A. COLEMAN. 1992. The transport of bioavailable phosphorus in agricultural runoff. J. Environ. Qual. 21: 30-35.

SHARPLEY, A.N., AND S.J. SMITH. 1993. Application of phosphorus bioavailability indices to agricultural runoff and soils, p. 43-57. *In* D.B. Hoddinott and T.A. O'Shay,[eds.] Application of agricultural analysis in environmental studies, ASM STP 1162, American Society for Testing and Material, Philadelphia,

SHIELDS, J.A., C. TARNOCAI, K.W.G. VALENTINE, AND K.B. MACDONALD. 1991. Soil landscapes of Canada. Procedures Manual and User's Handbook. Agriculture Canada Publication 1868/E, Communications Branch, Agriculture Canada, Ottawa, Ontario.

SOLORZANO, L. 1969. Determination of ammonia in natural waters by the phenolhypochlorite method. Limnol. Oceanogr. 14:799-801.

SORANNO, P.A., S.L. HUBLER, S.R. CARPENTER, AND R.C. LATHROP. in press. Phosphorus loads to surface waters: A simple model to account for spatial pattern of land use. Ecol. Appl.

STAINTON, M.P., M.J. CAPEL, AND F.A.J. ARMSTRONG. 1977. The chemical analysis of freshwater. 2nd. Ed. Can. Fish. Mar. Serv. Misc. Spec. Publ. 25. 180 p.

STEVENS, R.J., AND R.V. SMITH. 1978. A comparison of discrete and intensive sampling for measuring the loads of nitrogen and phosphorus in the river Main, County Antrim. Wat. Res. 12: 23-830.

STRONG, W.L. AND K.R. LEGGAT. 1992. Ecoregions of Alberta, Alberta Forestry, Lands and Wildlife, Information Services Division, Resource Information Branch, Edmonton, Alberta, 59 p.

TREW, D.O., D.J. BELIVEAU, AND E.E. YOUNGE. 1987. The Baptiste Lake study technical report. Water Quality Control Branch, Pollution Control Division, Environmental Protection Services, Alberta Environment. 380p.

VAITHIYANATHAN, P., AND D.L. CORRELL. 1992. The Rhode River watershed: phosphorus distribution and export in forest and agricultural soils. J.Environ. Qual. 21: 280-288.

WETZEL, R.G. 1983. Limnology (2nd edition) Saunders College Publishing, Toronto. 767 p.

XIAO, X.J., D.W. ANDERSON, AND J.R. BETTANY. 1991. The effect of pedogenetic processes on the distribution of phosphorus, calcium and magnesium in Gray Luvisols. Can. J. Soil Sci. 71: 397-410.

III. GENERAL DISCUSSION AND CONCLUSIONS

The objective of this research was to quantify and compare phosphorus (P) and nitrogen (N) export from small watersheds with primarily agricultural land uses to forest or undisturbed land on the boreal plain. Generally, the agricultural watersheds within the western boreal plain exported greater quantities of both P and N, than exclusively forested watersheds. These findings were consistent with other studies comparing nutrient export from agricultural and forest watersheds (e.g., Dillon and Kirchner 1975; Omnerik 1977). However, unlike most studies that identified particulate P (PP) as the dominant P fraction delivered from agricultural watersheds, most (average 83%) of the total P (TP) exported from agricultural watersheds on the boreal plain was in the dissolved fraction. Dissolved P (TDP) constituted 43% of the TP export from forest watersheds. Although most (~ 90%) TDP was soluble reactive P (SRP) in both the forest and agricultural watersheds, there was a 3.5- and 17-fold increase in SRP export from cropland and cattle production, respectively, when compared to SRP export from forest watersheds. Disproportionately high SRP export and high SRP concentrations (>200 $\mu g\ L^{-1}$) in streams draining cropland and cow-calf operations, suggest immediate P bioavailability (Bradford and Peters 1987; Bostrom et al. 1988), which likely stimulates downstream phytoplankton and macrophyte growth .

Agricultural practices also influenced the speciation of inorganic N (IN). Nitrate (NO_3^-) export predominated from cropland, while ammonium (NH_4^+) was the dominant form of inorganic N exported from the watershed with the cow-calf operations for beef production. Overall, IN export was 10- and 35-fold greater from cropland and cattle production, respectively, than from forest land. Since NH_4^+ and NO_3^- are N sources for phytoplankton, large loads of IN may enhance primary production in surface waters.

Most of the nutrient load and runoff volume was generated by large rainfall events in the cropland and forest watersheds. In contrast, most of the nutrient load was delivered in spring runoff from the watershed with the cow-calf operations even though spring runoff contributed less than one third of the total runoff. By understanding seasonal variation of nutrient export, environmental stewardship programs can focus land management practices to reduce nutrient loading during specific times of year. For instance, in watersheds that are heavily influenced by cattle, proper manure management and storage during the winter months would reduce the amount of nutrients running off the land during the spring. In addition, vegetative buffer strips adjacent to streams may reduce the quantity of dissolved nutrients being loaded to streams from cropland (Jordan et al. 1993). Although seasonal variation in nutrient loading is important in determining possible management strategies to reduce nutrient losses, year-to-year variation in climate (i.e., amount of snowpack, timing of rainfall events) may significantly alter seasonal nutrient loading (Meyer and Likens 1979).

Year-to-year variation in nutrient export from forest and agricultural watersheds was strongly related to hydrologic characteristics (i.e., stream discharge, runoff, precipitation). Less annual runoff and precipitation reduced total nutrient load in 1995 when compared to 1994. Furthermore, streams in the smaller agricultural watersheds were intermittent, flowing only during spring runoff and large rainfall events as compared to the perennial streams in the larger forest watersheds. The difference in discharge between forest and agricultural watersheds reduced the contrast in nutrient export (Hill 1978). Beaver dams regulated streamflow in the forest watersheds. The removal of a beaver dam in the fall of 1994 decreased the total discharge in 1995 by 5-fold. Consequently, the annual TP load in 1995 was one fifth of the TP load in 1994. In addition, TP export was similar from forest watersheds overlying sedimentary formations in both the boreal plain and the mixed hardwood forests located in central Ontario, however, the boreal plain receives, on average, 1.5 to 2 times less annual precipitation. Although hydrologic characteristics influenced nutrient export from watersheds on the boreal plain, other watershed characteristics probably influenced the delivery of nutrients to surface water.

Stream nutrient concentrations were likely affected by watershed slope, soil type, vegetation type and type of agricultural practice. Low sloping terrain which allows for longer leaching time for soil P and an increased depth of interaction between surface soil and runoff (Sharpley and Smith 1989) combined with loam textured Gray Luvisolic soils in the study watersheds facilitated the redistribution of soil P (Xiao et al. 1991) to streams. Therefore, subsurface flow likely contributed to the high concentrations of TDP (annual flow-weighted mean concentration (AFWMC) averaged 72 μg L^{-1}) in streams draining forest land and high TDP and NO_3^- concentrations and export in streams draining cropland. Also, application of fertilizer likely increased the concentrations of TDP and NO_3^- in runoff from cropland. Livestock wastes likely contributed to the high concentrations and subsequent export of TDP and NH_4^+ in the stream draining the cow-calf operations.

TP export from agricultural land on the boreal plain was comparable to low intensive agricultural practices conducted in southern Ontario, while SRP and NH_4^+ export were similar to more intensive agricultural practices (i.e. row-crops, high fertilizer application rates, high livestock densities). However, NO_3^- export from cropland is one to two orders of magnitude lower than from agricultural watersheds in southern Ontario where intensive use of N fertilizers and manure and N buildup in the soil contributes to extremely high NO_3^- export (Neilsen and MacKenzie 1977; Hill 1978; Coote et al. 1982). In the aspen-dominated forest watersheds, high stream particulate P (PP) concentrations (AFWMC averaged 98 μg L^{-1}) can be attributed to the large supply of leaf detritus produced by deciduous trees. In contrast, PP transport from coniferous-dominated watersheds on the boreal plain was small (Munn and Prepas 1986). Although agricultural land uses on the boreal plain increased stream P and N concentrations and total nutrient load, watershed characteristics likely also affected nutrient delivery.

In summary, common agricultural practices (non-row crop and cow-calf operations) increased stream P and N concentrations and loads, specifically in the dissolved fraction which is potentially more bioavailable for primary production. Therefore, other land uses, such as forest harvesting, also have the potential to affect surface water quality through increased P and N export. Given the high proportion of dissolved nutrients exported from agricultural watersheds on the boreal plain, management practices should focus on reducing total nutrient load (dissolved and particulate fractions) rather than only soil erosion control.

REFERENCES

BOSTROM, B., G. PERSSON, AND B. BROBERG. 1988. Bioavailability of different phosphorus forms in freshwater. Hydrobiol. 170:133-155

BRADFORD, M.E. AND R.H. PETERS. 1987. The relationship between chemically analyzed phosphorus fractions and bioavailable phosphorus. Limnol. Oceanogr. 32:1124-1137.

COOTE, D. R., E.M. MACDONALD, W.T. DICKINSON, R.C. OSTRY, AND R. FRANK. 1982. Agriculture and water quality in the Canadian Great Lakes Basin: I. Representative agricultural watersheds. J. Environ. Qual. 11: 473-481.

DILLON, P.J., AND W.B. KIRCHNER. 1975. The effects of geology and land use on the export of phosphorus from watersheds. Water Research. 9:135-148.

HILL, A.R. 1978. Factors affecting the export of nitrate-nitrogen from drainage basins in southern Ontario. Wat. Res. 12:1045-1057

JORDAN, T.E., D.L. CORRELL, AND D.E. WELLER. 1993. Nutrient interception by a riparian forest receiving inputs from adjacent cropland. J. Environ. Qual. 22: 46-473.

OMERNIK, J.M. 1977. Nonpoint source-stream nutrient level relationships: a nationwide study. EPA-600/3-77-105. United States Environmental Protection Agency, Corvallis, Oregon, USA. 106p.

MEYER, J.L., AND G.E. LIKENS. 1979. Transport and transformations of phosphorus in a forest stream ecosystem. Ecology 60:1255-1269.

MUNN, N., AND E.E. PREPAS. 1986. Seasonal dynamics of phosphorus partitioning and export in two streams in Alberta. Can. J. Fish. Aquat. Sci. 43: 2464-2471.

NEISEN, G.H., AND A.F. MACKENZIE. 1977. Relationships between soluble and sediment nutrient losses, land use and types of soil in agricultural watersheds. Proc. 12th Canadian Symp. Water Pollution Research Canada p. 121-134.

SHARPLEY, A.N., AND S.J. SMITH. 1989. Prediction of soluble phosphorus transport in agricultural runoff. J.Environ. Qual. 18: 313-316.

XIAO, X.J., D.W. ANDERSON, AND J.R. BETTANY. 1991. The effect of pedogenetic processes on the distribution of phosphorus, calcium and magnesium in Gray Luvisols. Can. J. Soil Sci. 71: 397-410.

APPENDIX A: Summary of monthly flow weighted mean concentrations of total phosphorus (TP), total dissolved phosphorus (TDP), particulate phosphorus (PP), nitrate + nitrite (NO_3^-) and ammonium (NH_4^+) for the two forested (F1 and F2) and agricultural (A1 and A2, site 1 and 2) watersheds for 1994 and 1995.

Table A1: Total phosphorus monthly flow weighted mean concentrations ($\mu g\ L^{-1}$) for 1994 and 1995 for the forested (F1 and F2) and agricultural (A1 and A2) watersheds.

	March		April		May		June		July		August		September		October	
Year	94	95	94	95	94	95	94	95	94	95	94	95	94	95	94	95
F1		192	91	105	102	119	120	117	137	118	133	239	104	99	85	
F2		237	106	101	133	86	179	181	127	158	233	221	147	132	139	
A1		684		351	319		466	457	479	329		304				
A2 - Site 1		4847	990	1307	621	902	646	651	745	633	316	589		543		
A2 - Site 2		1748	376	380	416	125	460	304	503	329	625	328		180		

Table A2: Total dissolved phosphorus monthly flow weighted mean concentrations ($\mu g\ L^{-1}$) for 1994 and 1995 for the forested (F1 and F2) and agricultural (A1 and A2) watersheds

	March		April		May		June		July		August		September		October	
Year	94	95	94	95	94	95	94	95	94	95	94	95	94	95	94	95
F1		102	56	34	63	24	66	35	64	47	52	55	34	48	29	
F2		168	68	67	52	42	89	80	59	88	155	98	78	83	58	
A1		632		312	258		354	286	404	311		235				
A2 - Site 1		4383	864	1159	571	663	582	559	678	571	302	513		501		
A2 - Site 2		1544	352	325	395	108	402	266	380	302	502	286		173		

Table A3: Total particulate phosphorus monthly flow weighted mean concentrations ($\mu g\ L^{-1}$) for 1994 and 1995 for the forested (F1 and F2) and agricultural (A1 and A2) watersheds.

	March		April		May		June		July		August		September		October	
Year	94	95	94	95	94	95	94	95	94	95	94	95	94	95	94	95
F1		90	34	71	40	95	54	82	72	70	81	183	71	50	56	
F2		70	39	34	71	43	90	101	68	70	77	123	69	49	81	
A1		52		38	61		111	171	75	18		69				
A2 - Site 1		464	126	147	50	239	63	92	67	63	14	66	41			
A2 - Site 2		205	24	55	21	17	49	38	57	27	123	42		8		

Table A4: Soluble reactive phosphorus monthly flow weighted mean concentrations ($\mu g\ L^{-1}$) for 1995 for the forested (F1 and F2) and agricultural (A1 and A2) watersheds.

	March	April	May	June	July	August	September
F1	123	12	12	20	39	37	47
F2	142	36	34	62	87	76	86
A1	482	218		251	177	185	
A2 - Site 1	3749	798	835	572	572	474	503
A2 - Site 2	779	261		222	310	235	274

Table A5: Nitrate monthly flow weighted mean concentrations (µg L^{-1}) for 1995 for the forested (F1 and F2) and agricultural (A1 and A2) watersheds.

	March	April	May	June	July	August	September
F1	350	306	26	21	30	37	39
F2	138	59	49	77	72	19	24
A1	5842	4892		1094	1760	37	
A2 - Site 1	1009	34	16	89	21	64	24
A2 - Site 2	439	50	33	83	10	107	8

Table A6: Ammonium monthly flow weighted mean concentrations (μg L^{-1}) for 1995 for the forested (F1 and F2) and agricultural (A1 and A2) watersheds.

	March	April	May	June	July	August	September
F1	91	92	24	22	30	24	11
F2	111	78	41	54	42	32	13
A1	40	24		64	298	30	
A2 - Site 1	21 864	585	121	224	70	119	45
A2 - Site 2	2 584	183	38	45	25	39	12

APPENDIX B: Summary of mean concentrations of dominant ions (± Standard Error) for the forested (F1 and F2) and agricultural (A1 and A2) watersheds for 1995.

Table B1: Mean stream concentrations of alkalinity, sulfate (SO_4^{2-}), calcium (Ca^{2+}), iron (Fe^{3+}) (mg L^{-1}) and conductivity (µS cm^{-1}) (± SE) for the forested (F1 and F2) and agricultural (A1 and A2) watersheds.

	Alkalinity (mg $CaCO_3$ L^{-1})	SO_4^{2-} (mg L^{-1})	Ca^{2+} (mg L^{-1})	Fe^{3+} (mg L^{-1})	Conductivity (µS cm^{-1})
F1	261.2 ±2.73	12.9 ±0.38	59.0 ±0.93	0.57 ±0.02	449.3 ±6.80
F2	145.7 ±2.49	19.3 ±0.59	55.2 ±1.44	1.07 ±0.02	359.2 ±6.31
A1	125.2 ±1.49	56.3 ±1.13	50.1 ±0.78	0.45 ±0.01	451.3 ±6.60
A2 - Site 1	130.3 ±1.03	14.9 ±0.33	40.8 ±0.46	0.53 ±0.02	460.0 ±21.9
A2 - Site 2	113.0 ±0.91	14.2 ±0.62	33.3 ±0.48	0.27 ±0.01	318.5 ±3.79

APPENDIX C: Summary of extractable phosphate (μg g^{-1}), ammonium (μg g^{-1}) and nitrate (μg g^{-1}) and pH from soil samples in the forested (F1 and F2) and agricultural (A1 and A2) watersheds during 1995.

Table C1: Extractable phosphate (PO_4^-) ($\mu g\ g^{-1}$) , ammonium (NH_4^+) ($\mu g\ g^{-1}$) , and nitrate (NO_3^-) ($\mu g\ g^{-1}$) concentrations and pH in soil samples collected on May 05 (O5/05), July 19 (07/19) and September 18 (09/18), 1995 in the forested (F1 and F2) and agricultural (A1 and A2) watersheds. (x - samples not taken)

Watershed	Extractable PO_4 ($\mu g\ g^{-1}$)			NH_4 ($\mu g\ g^{-1}$)			NO_3 ($\mu g\ g^{-1}$)			pH		
Sampling Date	05/05	07/19	09/18	05/05	07/19	09/18	05/05	07/19	09/18	05/05	07/19	09/18
F1	30.8	20.5	17.2	3.64	2.48	3.97	0.42	0.33	0.21	5.99	6.18	5.71
F2	7.75	5.58	4.81	4.18	7.47	3.60	4.28	2.73	0.61	6.12	5.96	5.88
A1	23.1	17.3	12.1	4.45	5.60	3.45	15.6	5.14	4.52	6.11	5.94	6.38
A2 - Site 1	x	0.98	0.3	x	6.00	3.82	x	12.6	13.8	x	7.68	7.84
A2 - Site 2	x	24.5	12.51	x	10.4	0.98	x	52.2	36.2	x	7.47	7.49

APPENDIX D: Total daily precipitation (mm) from the Athabasca 2 weather station for 1994 and 1995. Data from Environment Canada, Atmospheric Environment Monitoring Service.

Appendix D1: Total daily precipitation (mm) at the Athabasca 2 weather station for 1994. Data from Environment Canada.

Julian Day	Total Ppt. (mm)	Julian Day	Total Ppt. (mm)	Julian Day	Total Ppt. (mm)	Julian Day	Total Ppt. (mm)	Julian Day	Total Ppt. (mm)	Julian Day	Total Ppt. (mm)	Julian Day	Total Ppt. (mm)	Julian Day	Total Ppt. (mm)	Julian Day	Total Ppt. (mm)	Julian Day	Total Ppt. (mm)
1	3.6	38	0	75	2	112	0.8	149	2.6	186	0.6	223	0	260	0	297	0	334	0
2	5	39	0	76	0	113	0	150	8.2	187	1.4	224	0	261	0	298	0	335	0
3	2.4	40	1	77	11	114	0	151	19.4	188	0	225	0	262	0	299	0	336	6
4	6	41	0	78	7	115	0	152	19.8	189	8.6	226	0	263	1.6	300	0	337	0
5	2.6	42	3	79	0	116	0	153	0.2	190	3.4	227	3.6	264	0	301	0	338	0
6	5	43	0	80	0	117	0	154	0	191	10.6	228	1.4	265	0	302	0	339	0
7	0	44	2	81	0	118	0	155	0	192	7.6	229	0	266	0	303	0	340	0
8	7	45	0	82	0	119	0	156	0	193	7.6	230	0	267	0	304	12.6	341	0
9	0	46	0	83	0	120	0	157	0	194	8	231	0	268	0	305	9	342	0
10	3	47	5	84	0	121	0	158	0	195	0	232	0	269	0	306	0	343	6
11	7	48	1.6	85	0	122	0	159	0.6	196	0	233	0	270	0.6	307	0	344	0
12	8	49	2.6	86	0	123	3.6	160	0	197	0	234	8.2	271	0	308	0	345	1
13	1	50	0	87	0	124	0	161	0	198	3.2	235	0	272	1	309	0	346	0
14	7	51	0	88	0	125	0	162	0	199	0	236	0	273	6.2	310	0	347	0
15	3	52	2	89	0	126	0	163	0	200	0.6	237	0	274	6.6	311	0	348	0
16	0	53	2	90	0	127	0	164	12.8	201	0	238	0	275	4.4	312	0	349	0
17	5	54	1	91	0	128	0	165	17.4	202	0	239	0	276	1.6	313	0	350	0
18	2	55	0	92	0	129	0	166	15.2	203	0	240	0	277	0	314	0	351	0
19	1.6	56	0	93	0	130	0	167	1.6	204	0	241	2.2	278	0	315	0	352	0
20	0	57	0	94	0	131	0	168	0.2	205	0	242	0	279	0	316	3.2	353	0
21	1	58	0	95	0	132	0	169	0.4	206	0	243	4.6	280	0	317	0	354	0
22	2	59	0	96	0	133	0	170	0.4	207	0	244	26	281	0	318	0	355	0
23	3	60	0	97	0	134	2	171	0	208	0.4	245	0	282	0	319	0	356	0
24	0	61	0	98	0	135	1	172	0.3	209	1	246	0	283	0	320	0	357	0
25	0	62	0	99	0	136	23	173	0	210	0	247	31.2	284	0	321	0	358	0
26	0	63	0	100	0	137	0	174	0	211	0	248	0	285	0	322	0	359	0
27	0	64	0	101	0	138	0	175	0	212	4.6	249	0	286	0	323	2	360	2
28	0	65	0	102	0	139	0	176	0	213	0	250	0	287	0	324	8	361	0
29	0	66	0	103	0	140	3	177	0	214	0	251	0	288	0	325	0	362	13
30	0	67	0	104	0	141	11	178	15.3	215	0	252	1	289	0	326	0	363	0
31	0	68	0	105	0	142	1.8	179	0.2	216	0	253	0	290	0	327	0	364	0
32	0	69	0	106	0	143	0	180	17.3	217	0	254	1	291	0	328	1	365	0
33	0	70	0	107	0	144	0	181	2.6	218	9.3	255	0.4	292	0	329	0		
34	0	71	0.6	108	0.4	145	0	182	1.2	219	0	256	0	293	0	330	4		
35	3	72	0	109	0	146	2.6	183	40	220	0	257	0.2	294	8.2	331	0		
36	0	73	0	110	0	147	1.6	184	13	221	0	258	0	295	0.4	332	0		
37	0	74	0	111	0	148	0	185	3.4	222	0	259	0	296	0	333	0		

Appendix D2: Total daily precipitation (mm) at the Athabasca 2 weather station for 1995. Data from Environment Canada.

Julian Day	Total Ppt. (mm)	Julian Day	Total Ppt. (mm)	Julian Day	Total Ppt. (mm)	Julian Day	Total Ppt. (mm)	Julian Day	Total Ppt. (mm)	Julian Day	Total Ppt. (mm)	Julian Day	Total Ppt. (mm)	Julian Day	Total Ppt. (mm)	Julian Day	Total Ppt. (mm)	Julian Day	Total Ppt. (mm)
1	0	38	0	75	0	112	1.5	149	0	186	1	223	2.5	260	1	297	3	334	0
2	0	39	0	76	0	113	0	150	0	187	4	224	3	261	1	298	0	335	0
3	0	40	0	77	0	114	2.4	151	0	188	0	225	1.5	262	0	299	2.8	336	0
4	0	41	0	78	0	115	0	152	0	189	1	226	0	263	0	300	0	337	0
5	0	42	0	79	0	116	0	153	0	190	0	227	1.5	264	0	301	12	338	0
6	0	43	0	80	0.2	117	0	154	20	191	8.8	228	0	265	0	302	0	339	0
7	2	44	0	81	0	118	0	155	0	192	0	229	1.6	266	0	303	0	340	1
8	0	45	0	82	0	119	0	156	0	193	1.8	230	0.5	267	0	304	0	341	1
9	0	46	0	83	0	120	1.4	157	0	194	0	231	0	268	0	305	0	342	0
10	1	47	2	84	0	121	0	158	0	195	0	232	1.5	269	0	306	0	343	0
11	0	48	0	85	0	122	0	159	0	196	0	233	0	270	0	307	0	344	0
12	2	49	1	86	0	123	0.1	160	0	197	8	234	0	271	0	308	2.5	345	8
13	1	50	2	87	0	124	0	161	0	198	1	235	4	272	0	309	0	346	0
14	2	51	0	88	0	125	0	162	0	199	0	236	1	273	1.3	310	1.2	347	4
15	0	52	0	89	0	126	2.5	163	0	200	2.2	237	0	274	0	311	0	348	0
16	0	53	0	90	0	127	0.5	164	14.8	201	6.6	238	0	275	0	312	3	349	1
17	0	54	0	91	0.2	128	0	165	0	202	0	239	6.8	276	1	313	5	350	0
18	0	55	2	92	2	129	0	166	0	203	1	240	1	277	0.2	314	0	351	0
19	2	56	2	93	0	130	0	167	22.3	204	0	241	0	278	0	315	0	352	0
20	0	57	0	94	5	131	0	168	26	205	0	242	1	279	1.2	316	0	353	0
21	0	58	0	95	14	132	0	169	0.5	206	1.4	243	0	280	0	317	0	354	0
22	0	59	0	96	0	133	0	170	20.3	207	12	244	0	281	0	318	0	355	0
23	0	60	0	97	0	134	8	171	1.6	208	1.5	245	0	282	0	319	0	356	0
24	0	61	0	98	1	135	5	172	0.9	209	0	246	1	283	1.6	320	0	357	0
25	0	62	0	99	0	136	0	173	0	210	10	247	0.5	284	0	321	0	358	0
26	0	63	0	100	0	137	1.5	174	0	211	7.6	248	0	285	0	322	0.2	359	0
27	0	64	0	101	0.6	138	1	175	0	212	3.3	249	0	286	0	323	0	360	0
28	0	65	0	102	1.2	139	4.8	176	16.4	213	0	250	0	287	0	324	0	361	0
29	0	66	0	103	2.6	140	0	177	0	214	0	251	0	288	0	325	0	362	0
30	0	67	0	104	7.6	141	0	178	0	215	0.1	252	0	289	14	326	2	363	0
31	0	68	1	105	0	142	0	179	0	216	0	253	0	290	4.5	327	0.5	364	0
32	0	69	5	106	0	143	0	180	8	217	4	254	0	291	0	328	9	365	2
33	0.3	70	0	107	0	144	4.5	181	5	218	5	255	0	292	0	329	13		
34	3	71	0	108	0	145	0	182	1	219	4.5	256	0	293	0	330	2.5		
35	0	72	0	109	0	146	0	183	0	220	62.5	257	0	294	0	331	3.5		
36	0	73	0	110	0	147	0	184	0	221	18	258	0	295	0	332	9.6		
37	0	74	0	111	0	148	0	185	10	222	0.5	259	0	296	0	333	0		

APPENDIX E: Physical and chemical data collected from the forested (F1 and F2) and agricultural (A1 and A2) watersheds for 1994 and 1995.

Legend:

1. Year
2. Julian Day
3. Time (h)
4. Total Phosphorus Concentration ($\mu g\ L^{-1}$)
5. Total Dissolved Phosphorus Concentration ($\mu g\ L^{-1}$)
6. Total Particulate Phosphorus Concentration ($\mu g\ L^{-1}$)
7. Soluble Reactive Phosphorus Concentration ($\mu g\ L^{-1}$)
8. Nitrate + nitrite (NO_3^-) ($\mu g\ L^{-1}$)
9. Ammonium (NH_4^+) ($\mu g\ L^{-1}$)
10. Total Alkalinity (mg L^{-1} $CaCO_3$)
11. Stream pH
12. Stream Temperature (°C)
13. Specific Conductance ($\mu S\ cm^{-1}$)
14. Sulfate (SO_4) (mg L^{-1})
15. Calcium (Ca) (mg L^{-1})
16. Iron (Fe) (mg L^{-1})
17. Discharge ($m^3\ sec^{-1}$)
18. Time Weighted Total Phosphorus Load (kg)
19. Time Weighted Total Dissolved Phosphorus Load (kg)
20. Time Weighted Total Particulate Phosphorus Load (kg)
21. Time Weighted Soluble Reactive Phosphorus Load (kg)
22. Time Weighted Nitrate Load (kg)
23. Time Weighted Ammonium Load (kg)

Appendix E1: Physical and chemical data collected from the forested watershed F1 for 1994 and 1995.

1	2	3	4	5	6	7	8	9	10	11.0	12	13	14	15	16	17	18	19	20	21	22	23
1994	114	1015	102.9	60.3	42.6					7.7	4	227				0.3067	25.56	14.98	10.58	0.00	0.00	0.00
1994	115																0.00	0.00	0.00	0.00	0.00	0.00
1994	116	1010	91.3	57.3	34.0					7.6	4	260				0.2483	43.32	27.19	16.13	0.00	0.00	0.00
1994	117																0.00	0.00	0.00	0.00	0.00	0.00
1994	118																0.00	0.00	0.00	0.00	0.00	0.00
1994	119	1030	85.6	53.9	31.7					7.9	6	366				0.2230	52.65	33.15	19.50	0.00	0.00	0.00
1994	120																0.00	0.00	0.00	0.00	0.00	0.00
1994	121																0.00	0.00	0.00	0.00	0.00	0.00
1994	122																0.00	0.00	0.00	0.00	0.00	0.00
1994	123	0950	213.0	177.5	35.5	154.9				7.7	9	316				0.2002	154.96	129.13	25.83	0.00	0.00	0.00
1994	124																0.00	0.00	0.00	0.00	0.00	0.00
1994	125	1030	88.1	58.6	29.5					8.0	9	296				0.2230	32.55	21.65	10.90	0.00	0.00	0.00
1994	126																0.00	0.00	0.00	0.00	0.00	0.00
1994	127	1045	90.2	59.1	31.1					7.6	11	285				0.2113	33.85	22.18	11.67	0.00	0.00	0.00
1994	128																0.00	0.00	0.00	0.00	0.00	0.00
1994	129																0.00	0.00	0.00	0.00	0.00	0.00
1994	130	1120	94.9	64.8	30.1					7.9	11	410				0.1521	45.31	30.94	14.37	0.00	0.00	0.00
1994	131																0.00	0.00	0.00	0.00	0.00	0.00
1994	132																0.00	0.00	0.00	0.00	0.00	0.00
1994	133	1130	88.9	57.7	31.2					8.0	12	351				0.1147	30.74	19.95	10.79	0.00	0.00	0.00
1994	134																0.00	0.00	0.00	0.00	0.00	0.00
1994	135																0.00	0.00	0.00	0.00	0.00	0.00
1994	136	0755	95.4	58.8	36.6	39.9				7.6	10	377				0.1607	32.40	19.97	12.43	0.00	0.00	0.00
1994	136	1405	102.0	56.9	45.1	36.2				8.0		333				0.2353	4.36	2.43	1.93	0.00	0.00	0.00
1994	136	2040	140.9	75.0	65.9	39.8				8.1		340				0.3893	10.30	5.48	4.82	0.00	0.00	0.00
1994	137	0820	117.6	78.2	39.4	38.5				8.0		338				0.3775	19.48	12.95	6.53	0.00	0.00	0.00
1994	137	2002	103.5	62.6	40.9	37.4				8.0	9	316				0.3775	16.17	9.78	6.39	0.00	0.00	0.00
1994	138																0.00	0.00	0.00	0.00	0.00	0.00
1994	139	1155	98.8	54.7	44.1	31.7				8.1	8	242				0.4182	56.60	31.33	25.26	0.00	0.00	0.00
1994	140	2030	84.7	48.6	36.1	29.4				8.0		240				0.4182	41.44	23.78	17.66	0.00	0.00	0.00
1994	141	0930	93.9	44.8	49.1	32.1				8.0		245				0.6243	22.90	10.93	11.98	0.00	0.00	0.00
1994	141	2055	94.6	46.1	48.5	34.6				8.0		242				0.8357	28.59	13.93	14.66	0.00	0.00	0.00
1994	142	1600	77.9	39.9	38.0	28.8				8.1		198				0.8357	44.53	22.81	21.72	0.00	0.00	0.00
1994	143	1400	84.8	40.6	44.2	29.2				8.0		214				0.7589	53.52	25.62	27.90	0.00	0.00	0.00
1994	144																0.00	0.00	0.00	0.00	0.00	0.00
1994	145	0935	76.1	43.8	32.3	26.9				7.9		229				0.5655	78.95	45.45	33.49	0.00	0.00	0.00
1994	146																0.00	0.00	0.00	0.00	0.00	0.00

Appendix E1

1	2	3	4	5	6	7	8	9	10	11.0	12	13	14	15	16	17	18	19	20	21	22	23
1994	147	0911	122.3	60.0	62.3	42.1				7.8	15	248				0.4628	107.53	52.75	54.78	0.00	0.00	0.00
1994	148																0.00	0.00	0.00	0.00	0.00	0.00
1994	149																0.00	0.00	0.00	0.00	0.00	0.00
1994	150	1430	94.0	55.3	38.7					7.9	16	260				0.4182	115.52	67.96	47.56	0.00	0.00	0.00
1994	150	1600	96.1	54.3	41.8					8.1						0.3793	2.07	1.17	0.90	0.00	0.00	0.00
1994	150	2000	101.5	54.7	46.8					8.1						0.3793	5.54	2.99	2.56	0.00	0.00	0.00
1994	151	0000	100.1	58.2	41.9					8.0						0.3793	5.47	3.18	2.29	0.00	0.00	0.00
1994	151	0400	100.1	54.3	45.8					8.0						0.3793	5.47	2.97	2.50	0.00	0.00	0.00
1994	151	0800	92.2	56.1	36.1					8.0						0.3793	5.04	3.06	1.97	0.00	0.00	0.00
1994	151	1200	91.9	56.4	35.5					8.1						0.3793	5.02	3.08	1.94	0.00	0.00	0.00
1994	151	1400	90.4	63.2	27.2					7.9	16					0.3404	2.34	1.64	0.70	0.00	0.00	0.00
1994	151	2000	98.8	59.1	39.7							254				0.5145	9.12	5.46	3.67	0.00	0.00	0.00
1994	152	0400	96.6	57.6	39.0							255				0.5145	14.31	8.53	5.78	0.00	0.00	0.00
1994	152	1200	108.8	61.9	46.9							259				0.5145	16.12	9.17	6.95	0.00	0.00	0.00
1994	152	1600	99.1	56.2	42.9							260				0.5145	7.34	4.16	3.18	0.00	0.00	0.00
1994	152	2000	107.0	59.4	47.6							260				0.5145	7.93	4.40	3.53	0.00	0.00	0.00
1994	153	0000	110.2	57.9	52.3							257				0.5145	8.16	4.29	3.87	0.00	0.00	0.00
1994	153	0400	116.7	68.4	48.3							265				0.5145	8.65	5.07	3.58	0.00	0.00	0.00
1994	153	0800	118.5	69.8	48.7							268				0.5145	8.78	5.17	3.61	0.00	0.00	0.00
1994	153	1010	112.7	65.9	46.8							270				0.6886	4.88	2.85	2.03	0.00	0.00	0.00
1994	153	1600	96.2	48.7	47.5							268				0.6886	14.31	7.24	7.06	0.00	0.00	0.00
1994	154	0000	92.3	53.4	38.9							255				0.6886	18.30	10.59	7.71	0.00	0.00	0.00
1994	154	0800	108.3	59.1	49.2							240				0.6886	21.48	11.72	9.76	0.00	0.00	0.00
1994	154	1400	99.4	53.4	46.0							230				0.6886	14.78	7.94	6.84	0.00	0.00	0.00
1994	154	1600	100.8	51.9	48.9							228				0.6886	5.00	2.57	2.42	0.00	0.00	0.00
1994	155	0000	110.1	60.1	50.0							227				0.6271	20.86	11.39	9.47	0.00	0.00	0.00
1994	155	0800	111.2	63.4	47.8							224				0.5655	19.10	10.89	8.21	0.00	0.00	0.00
1994	155	1600	88.8	48.0	40.8											0.5655	14.46	7.82	6.64	0.00	0.00	0.00
1994	156	0000	100.6	49.1	51.5											0.4715	15.02	7.33	7.69	0.00	0.00	0.00
1994	156	0800	95.2	49.4	45.8											0.4715	12.93	6.71	6.22	0.00	0.00	0.00
1994	156	1600	95.6	51.9	43.7							233.8				0.4715	12.98	7.05	5.93	0.00	0.00	0.00
1994	157	0000	103.4	59.8	43.6							239.2				0.4715	14.04	8.12	5.92	0.00	0.00	0.00
1994	157	0800	122.8	75.2	47.6					7.9		237				0.4715	16.68	10.21	6.46	0.00	0.00	0.00
1994	158	2000	136.2	57.3	78.9											0.3590	28.89	12.15	16.73	0.00	0.00	0.00
1994	158	1600	131.2	68.8	62.4											0.3590	27.13	14.23	12.90	0.00	0.00	0.00
1994	159	0800	133.3	64.8	68.5					7.9		230.4				0.3590	27.56	13.40	14.16	0.00	0.00	0.00
1994	160	0000	168.6	81.4	87.2							245.4				0.3083	31.50	15.21	16.29	0.00	0.00	0.00

Appendix E1

1	2	3	4	5	6	7	8	9	10	11.0	12	13	14	15	16	17	18	19	20	21	22	23
1994	160	1600	149.1	133.2	15.9							257.4				0.3083	26.48	23.65	2.82	0.00	0.00	0.00
1994	161	0800	180.2	121.6	58.6						14	261.6				0.3083	32.00	21.59	10.41	0.00	0.00	0.00
1994	161	0955														0.2761	0.00	0.00	0.00	0.00	0.00	0.00
1994	162	0400	160.4	96.5	63.9							261.8				0.2496	30.35	18.26	12.09	0.00	0.00	0.00
1994	162	2000	119.0	71.8	47.2							264.6				0.2496	17.11	10.32	6.79	0.00	0.00	0.00
1994	163	1200	137.2	83.5	53.7							270.4				0.2496	19.73	12.00	7.72	0.00	0.00	0.00
1994	163	1600	141.0	78.7	62.3							271.4				0.2817	5.12	2.86	2.26	0.00	0.00	0.00
1994	163	2000	140.7	130.4	10.3							280.8				0.2817	5.71	5.29	0.42	0.00	0.00	0.00
1994	164	0000	170.4	141.4	29.0							287.3				0.2817	6.91	5.74	1.18	0.00	0.00	0.00
1994	164	0400	146.5	89.4	57.1							293.8				0.2817	5.94	3.63	2.32	0.00	0.00	0.00
1994	164	0800	128.2	90.5	37.7							284.8				0.2817	5.20	3.67	1.53	0.00	0.00	0.00
1994	164	1200	135.6	76.9	58.7											0.4530	7.75	4.39	3.35	0.00	0.00	0.00
1994	164	1600	143.2	80.0	63.2							279.3				0.7006	13.05	7.29	5.76	0.00	0.00	0.00
1994	164	2000	140.3	71.2	69.1							284.2				0.7006	14.15	7.18	6.97	0.00	0.00	0.00
1994	165	0000	139.5	78.2	61.3							281.3				0.7006	14.07	7.89	6.18	0.00	0.00	0.00
1994	165	0400	142.5	80.4	62.1							290.1				0.7006	14.38	8.11	6.27	0.00	0.00	0.00
1994	165	0800	134.8	80.4	54.4							267.5				0.7006	13.60	8.11	5.49	0.00	0.00	0.00
1994	165	1200	155.0	99.1	55.9							259.7				0.7006	15.64	10.00	5.64	0.00	0.00	0.00
1994	165	1600	119.6	61.8	57.9							247.5				1.0275	16.05	8.29	7.76	0.00	0.00	0.00
1994	165	2000	117.8	66.1	51.7							227.9				1.0275	17.43	9.79	7.64	0.00	0.00	0.00
1994	166	0000	124.6	62.5	62.1							230				1.0275	18.44	9.25	9.19	0.00	0.00	0.00
1994	166	0400	122.9	61.4	61.5							223.6				1.0275	18.18	9.08	9.10	0.00	0.00	0.00
1994	166	0800	114.2	59.2	55.0							212.8				1.0275	16.90	8.76	8.14	0.00	0.00	0.00
1994	166	1200	112.7	59.2	53.5							207.4				1.2193	19.79	10.39	9.39	0.00	0.00	0.00
1994	166	1600	109.1	58.9	50.2							208.4				1.2193	19.16	10.34	8.81	0.00	0.00	0.00
1994	166	2000	112.7	56.0	56.7						11	204.1				1.2193	19.79	9.83	9.96	0.00	0.00	0.00
1994	167	0000	114.5	52.3	62.2							199.9				1.1152	19.25	8.79	10.45	0.00	0.00	0.00
1994	167	0400	108.7	51.2	57.5							195.8				1.1152	17.46	8.22	9.23	0.00	0.00	0.00
1994	167	0800	105.8	53.0	52.8							191.8				1.1152	16.99	8.51	8.48	0.00	0.00	0.00
1994	167	1200	97.4	52.3	45.1							195.8				1.1152	15.64	8.40	7.24	0.00	0.00	0.00
1994	167	1600	98.5	52.3	46.2						12	195.8				1.1152	15.82	8.40	7.42	0.00	0.00	0.00
1994	168	0000	99.1	43.6	55.5							198				0.9653	28.20	12.41	15.79	0.00	0.00	0.00
1994	168	0800	94.0	41.1	52.9							200				0.9653	26.13	11.43	14.71	0.00	0.00	0.00
1994	168	1600	92.9	33.7	59.2							200				0.9653	25.81	9.37	16.45	0.00	0.00	0.00
1994	169	0000	101.8	38.2	63.6							202				0.9653	28.30	10.61	17.69	0.00	0.00	0.00
1994	169	0800	94.0	41.1	52.8							206				0.9653	26.12	11.43	14.69	0.00	0.00	0.00
1994	169	1600	91.7	47.5	44.3							208				0.7719	22.34	11.56	10.79	0.00	0.00	0.00

Appendix E1

1	2	3	4	5	6	7	8	9	10	11.0	12	13	14	15	16	17	18	19	20	21	22	23
1994	170	0000	109.6	42.3	67.4							211				0.7719	24.36	9.39	14.97	0.00	0.00	0.00
1994	170	0800	106.2	44.1	62.1							210				0.7719	23.61	9.80	13.81	0.00	0.00	0.00
1994	170	1600	115.2	45.6	69.6							216.8				0.7719	25.61	10.14	15.47	0.00	0.00	0.00
1994	171	0000	107.4	41.5	65.9							215				0.7719	23.88	9.23	14.65	0.00	0.00	0.00
1994	171	0800	113.3	47.5	65.8							220				0.7719	25.19	10.56	14.63	0.00	0.00	0.00
1994	171	1300	107.3	49.7	57.6						16	222.2				0.7719	11.93	5.52	6.41	0.00	0.00	0.00
1994	172	0000	106.6	55.7	51.0							220				0.5681	18.30	9.56	8.75	0.00	0.00	0.00
1994	172	0800	118.2	58.6	59.6							223.7				0.5681	19.34	9.59	9.75	0.00	0.00	0.00
1994	172	1200	115.9								16	230				0.5681	9.48	0.00	9.48	0.00	0.00	0.00
1994	172	1400														0.5118	0.00	0.00	0.00	0.00	0.00	0.00
1994	173																					
1994	174																					
1994	175																					
1994	176																					
1994	177																					
1994	178	1030	139.0	94.6	44.4											0.1795	246.47	167.74	78.73	0.00	0.00	0.00
1994	178	1420									16					0.2230	0.00	0.00	0.00	0.00	0.00	0.00
1994	178	2300	138.7	74.3	64.4											0.2230	13.92	7.45	6.46	0.00	0.00	0.00
1994	179	1100	152.6	83.9	68.7											0.2230	14.70	8.08	6.62	0.00	0.00	0.00
1994	180	0950	150.1	84.6	65.5						15					0.2230	27.72	15.62	12.10	0.00	0.00	0.00
1994	180	2000	141.7	79.2	62.5											0.2116	11.09	6.20	4.89	0.00	0.00	0.00
1994	181	0800	142.4	82.1	60.3											0.2116	13.02	7.50	5.51	0.00	0.00	0.00
1994	181	2000	129.3	86.8	42.5											0.2116	11.82	7.93	3.88	0.00	0.00	0.00
1994	182	1200	136.2	86.8	49.4											0.2116	16.61	10.58	6.03	0.00	0.00	0.00
1994	182	2000	127.2	87.5	39.7							283.2				0.3560	10.19	7.01	3.18	0.00	0.00	0.00
1994	183	0000	166.8	99.5	67.3											0.3560	8.55	5.10	3.45	0.00	0.00	0.00
1994	183	0400	162.4	87.9	74.5							260.7				0.3560	8.33	4.51	3.82	0.00	0.00	0.00
1994	183	0800	152.6	94.1	58.5											0.3560	7.82	4.82	3.00	0.00	0.00	0.00
1994	183	1200	163.1	95.2	68.0							284				0.3560	8.36	4.88	3.48	0.00	0.00	0.00
1994	183	1600	152.6	80.6	72.0							283.2				0.8656	15.13	8.00	7.14	0.00	0.00	0.00
1994	183	2000	155.5	84.6	70.9							275.4				0.8656	19.38	10.55	8.83	0.00	0.00	0.00
1994	184	0000	165.0	80.6	84.3											0.8656	20.56	10.05	10.51	0.00	0.00	0.00
1994	184	0400	154.4	82.1	72.3											0.8655	19.25	10.23	9.02	0.00	0.00	0.00
1994	184	0800	185.7	101.0	84.7							274.4				0.8656	23.15	12.59	10.56	0.00	0.00	0.00
1994	184	1200	157.2	69.8	87.4							263.9				1.7573	33.69	14.96	18.73	0.00	0.00	0.00
1994	184	1600	159.7	65.2	94.5							246.5				1.7573	40.41	16.50	23.91	0.00	0.00	0.00
1994	184	2000	196.2	62.0	134.2							244.4				2.9146	73.60	23.26	50.34	0.00	0.00	0.00

Appendix E1

1	2	3	4	5	6	7	8	9	10	11.0	12	13	14	15	16	17	18	19	20	21	22	23
1994	185	0000	268.7	52.7	216.0							250				2.9146	112.77	22.12	90.66	0.00	0.00	0.00
1994	185	0400	197.3	58.4	138.9							212				2.9146	82.81	24.51	58.30	0.00	0.00	0.00
1994	185	0800	177.8	53.1	124.7							213.2				2.9146	74.62	22.29	52.34	0.00	0.00	0.00
1994	185	1200	164.3	58.8	105.5							192.9				3.2566	80.33	28.75	51.58	0.00	0.00	0.00
1994	185	1600	157.2	58.4	98.8							184.8				3.2566	73.72	27.39	46.33	0.00	0.00	0.00
1994	185	2000	147.9	60.6	87.3							194.5				3.2566	69.36	28.42	40.94	0.00	0.00	0.00
1994	186	0000	155.0	72.3	82.7							192.9				3.2566	72.69	33.91	38.78	0.00	0.00	0.00
1994	186	0400	138.7	57.0	81.7							185.6				3.2566	65.04	26.73	38.31	0.00	0.00	0.00
1994	186	0800	126.6	54.2	72.4											3.2566	59.37	25.42	33.95	0.00	0.00	0.00
1994	186	1200	122.3	51.9	70.4							180.3				2.5404	48.60	20.63	27.97	0.00	0.00	0.00
1994	186	1600	111.3	50.1	61.2							189				2.5404	40.72	18.32	22.40	0.00	0.00	0.00
1994	186	2000	121.9	53.0	68.9							187.7				2.5404	44.59	19.39	25.20	0.00	0.00	0.00
1994	187	0000	128.4	51.9	76.5							192.8				2.5404	46.96	18.99	27.98	0.00	0.00	0.00
1994	187	0400	119.7	65.2	54.5							199				2.5404	43.79	23.85	19.94	0.00	0.00	0.00
1994	187	0800	126.6	64.9	61.7							200.9				2.5404	46.31	23.74	22.57	0.00	0.00	0.00
1994	187	1200	109.6	58.0	51.6							192				2.5404	40.09	21.22	18.88	0.00	0.00	0.00
1994	187	1600	112.1	65.2	46.9							195.9				2.5404	41.01	23.85	17.16	0.00	0.00	0.00
1994	187	2000	113.2	59.8	53.4							189				2.5404	41.41	21.88	19.53	0.00	0.00	0.00
1994	188	0000	234.8	60.9	173.9							199.9				2.5404	85.89	22.28	63.62	0.00	0.00	0.00
1994	188	0400	148.2	60.5	87.7							205.8				2.5404	54.21	22.13	32.08	0.00	0.00	0.00
1994	188	0800	263.0	63.1	199.9							202				2.5404	96.21	23.07	73.14	0.00	0.00	0.00
1994	188	1200	125.6	44.8	80.8							239.7				1.5562	33.08	11.80	21.28	0.00	0.00	0.00
1994	188	1600	107.8	45.2	62.6							208.1				1.5562	24.16	10.13	14.03	0.00	0.00	0.00
1994	188	2000	100.9	45.9	55.0							208				1.5562	22.61	10.29	12.33	0.00	0.00	0.00
1994	189	0000	101.7	42.3	59.4							193.8				1.5562	22.78	9.47	13.31	0.00	0.00	0.00
1994	189	0400	114.7	51.0	63.7							212				1.5562	25.70	11.43	14.27	0.00	0.00	0.00
1994	189	0800	115.5	53.6	62.0							204				1.5562	25.89	12.00	13.89	0.00	0.00	0.00
1994	189	1200	109.8	53.2	56.6							245.8				1.5562	24.60	11.92	12.68	0.00	0.00	0.00
1994	189	1600	102.6	55.7	46.8							214.2				1.5562	22.98	12.49	10.50	0.00	0.00	0.00
1994	189	2000	112.3	58.6	53.7							205				1.5562	25.16	13.13	12.03	0.00	0.00	0.00
1994	190	0000	107.6	56.8	50.8							254.8				1.5562	24.11	12.73	11.39	0.00	0.00	0.00
1994	190	0400	111.2	67.6	43.6							222				1.5562	24.92	15.15	9.77	0.00	0.00	0.00
1994	190	0800	115.5	68.3	47.2							217				1.5562	25.88	15.31	10.58	0.00	0.00	0.00
1994	190	2000	117.3	55.7	61.6							235.2				0.9234	49.01	23.28	25.73	0.00	0.00	0.00
1994	191	0800	119.5	68.0	51.5							242.9				0.9234	47.67	27.13	20.54	0.00	0.00	0.00
1994	191	2000	119.1	67.6	51.5							244.8				0.9234	47.51	26.97	20.54	0.00	0.00	0.00
1994	192	0800	108.7	63.9	44.8											0.9234	13.36	25.49	17.87	0.00	0.00	0.00

Appendix E1

1	2	3	4	5	6	7	8	9	10	11.0	12	13	14	15	16	17	18	19	20	21	22	23
1994	192	2000	117.7	68.7	49.0							252.4				0.7973	18.57	10.85	7.73	0.00	0.00	0.00
1994	193	0800	116.2	73.0	43.2							245.8				0.7973	40.02	25.14	14.88	0.00	0.00	0.00
1994	193	2000	114.4	73.7	40.7							243.4				0.7973	39.40	25.38	14.02	0.00	0.00	0.00
1994	194	0800	112.7	79.1	33.6							242				0.7973	38.82	27.24	11.57	0.00	0.00	0.00
1994	194	2000	100.9	57.5	43.4							308.9				0.5682	28.92	16.48	12.44	0.00	0.00	0.00
1994	195	0800	104.4	56.4	48.0							260.3				0.5682	25.63	13.84	11.78	0.00	0.00	0.00
1994	195	2000	103.7	57.8	45.9							261.4				0.5682	25.45	14.19	11.27	0.00	0.00	0.00
1994	196	0800	105.1	61.0	44.1							271.1				0.5682	25.80	14.97	10.82	0.00	0.00	0.00
1994	196	2000	103.4	63.2	40.2											0.5682	25.38	15.51	9.87	0.00	0.00	0.00
1994	197	0800	111.5	67.1	44.4											0.5682	27.37	16.47	10.90	0.00	0.00	0.00
1994	197	2000	103.0	69.9	33.1											0.5682	25.28	17.16	8.12	0.00	0.00	0.00
1994	198	0800	120.1	77.0	43.1											0.5682	29.48	18.90	10.58	0.00	0.00	0.00
1994	198	2000	128.2	80.2	48.0											0.5682	31.47	19.69	11.78	0.00	0.00	0.00
1994	199	0800	122.6	82.0	40.6											0.5682	30.09	20.13	9.97	0.00	0.00	0.00
1994	199	2000	122.3	88.2	34.1							271.1				0.3421	19.01	13.71	5.30	0.00	0.00	0.00
1994	200	0800	129.0	73.0	56.0							290.5				0.3421	19.07	10.79	8.28	0.00	0.00	0.00
1994	200	2000	123.4	86.1	37.3							281.9				0.3421	18.24	12.72	5.51	0.00	0.00	0.00
1994	201	0800	130.8	81.6	49.2							280.8				0.3421	19.33	12.06	7.27	0.00	0.00	0.00
1994	202	0000	126.9	80.2	46.8											0.2431	20.09	12.69	7.40	0.00	0.00	0.00
1994	202	1200	142.7	91.4	51.3											0.2431	14.99	9.60	5.39	0.00	0.00	0.00
1994	203	0000	153.6	93.5	60.1											0.2431	16.13	9.82	6.31	0.00	0.00	0.00
1994	203	0800	146.9	93.2	53.7											0.2431	10.28	6.53	3.76	0.00	0.00	0.00
1994	203	2000	138.0	92.2	45.8							292.6				0.1471	9.73	6.50	3.23	0.00	0.00	0.00
1994	204	0800	154.2	101.9	52.3							312				0.1471	9.80	6.48	3.32	0.00	0.00	0.00
1994	204	2000	151.3	102.3	49.0							307.4				0.1471	9.61	6.50	3.11	0.00	0.00	0.00
1994	205	0800	143.7	90.8	52.9							315				0.1471	9.13	5.77	3.36	0.00	0.00	0.00
1994	205	2000	160.0	107.3	52.7							255				0.1471	10.17	6.82	3.35	0.00	0.00	0.00
1994	206	0800	164.7	94.7	70.0							312				0.1471	10.47	6.02	4.45	0.00	0.00	0.00
1994	206	2000	140.5	92.2	48.3							334.8				0.1029	6.60	4.33	2.27	0.00	0.00	0.00
1994	207	800	141.2	88.6	52.6							340.2				0.1029	6.28	3.94	2.34	0.00	0.00	0.00
1994	207	2000	122.1	69.8	52.3							345.6				0.1029	5.43	3.10	2.32	0.00	0.00	0.00
1994	208	0800	152.8	82.8	70.0							355.3				0.1029	6.79	3.68	3.11	0.00	0.00	0.00
1994	208	2000	139.4	76.3	63.1							345.6				0.1029	6.20	3.39	2.80	0.00	0.00	0.00
1994	209	0800	162.9	90.7	72.2							356.4				0.1029	7.24	4.03	3.21	0.00	0.00	0.00
1994	210	0000	148.0	82.3	65.7							331.5				0.1029	8.27	4.60	3.67	0.00	0.00	0.00
1994	210	1200	164.8	109.0	55.8							332.2				0.1029	7.33	4.85	2.48	0.00	0.00	0.00
1994	211	0000	183.8	160.0	23.8							336.3				0.1029	8.17	7.11	1.06	0.00	0.00	0.00

Appendix E1

1	2	3	4	5	6	7	8	9	10	11.0	12	13	14	15	16	17	18	19	20	21	22	23
1994	211	1200	153.8	89.6	64.2							342.7				0.1029	6.84	3.98	2.85	0.00	0.00	0.00
1994	212	0000	156.0	79.8	76.2							359.5				0.1029	6.93	3.55	3.39	0.00	0.00	0.00
1994	212	1200	174.3	82.0	92.3							330.6				0.1029	7.75	3.65	4.10	0.00	0.00	0.00
1994	213	1200	171.3	98.9	72.4											0.0934	15.40	8.89	6.51	0.00	0.00	0.00
1994	214	1200	168.4	77.1	91.3											0.0934	13.59	6.22	7.37	0.00	0.00	0.00
1994	215	1200	146.7	62.3	84.4											0.0934	11.84	5.03	6.81	0.00	0.00	0.00
1994	216	1200	157.5	69.5	88.0											0.0934	12.71	5.61	7.10	0.00	0.00	0.00
1994	217	1200	121.7	49.1	72.6							462				0.0720	7.57	3.05	4.52	0.00	0.00	0.00
1994	218	1200	132.1	59.6	72.5							462				0.0720	8.22	3.71	4.51	0.00	0.00	0.00
1994	219	1200	150.2	61.0	69.2							462				0.0720	9.34	3.79	5.55	0.00	0.00	0.00
1994	220	1200	150.9	77.6	73.3							484				0.0720	9.39	4.83	4.56	0.00	0.00	0.00
1994	221	1200	156.7	65.0	91.7							484				0.0720	9.75	4.04	5.70	0.00	0.00	0.00
1994	222	1200	132.1	59.0	73.1							407				0.0679	7.99	3.57	4.42	0.00	0.00	0.00
1994	223	1200	117.4	48.5	68.9							424.6				0.0679	6.89	2.85	4.04	0.00	0.00	0.00
1994	224	1200	132.1	56.1	76.0							418				0.0679	7.75	3.29	4.46	0.00	0.00	0.00
1994	225	1200	100.4	50.0	50.5							418				0.0679	5.89	2.93	2.96	0.00	0.00	0.00
1994	226	1200	132.9	52.1	80.8							418				0.0679	7.80	3.06	4.74	0.00	0.00	0.00
1994	227	1200	128.9	47.4	81.5							412.5				0.0679	7.56	2.78	4.78	0.00	0.00	0.00
1994	228	1200	123.8	36.6	87.2							431.2				0.0586	6.55	1.94	4.62	0.00	0.00	0.00
1994	229	1200	126.0	32.3	93.7							513.5				0.0586	6.38	1.64	4.74	0.00	0.00	0.00
1994	230	1200	130.4	34.8	95.6							528.2				0.0586	6.60	1.76	4.84	0.00	0.00	0.00
1994	231	1200	109.7	29.0	80.7							432				0.0586	5.55	1.47	4.09	0.00	0.00	0.00
1994	232	1200	113.7	27.9	85.8							432.4				0.0586	5.76	1.41	4.34	0.00	0.00	0.00
1994	233	0930	107.9	37.7	70.2					8.0	17	469.2				0.0586	4.89	1.71	3.18	0.00	0.00	0.00
1994	233	1200	118.1	36.3	81.9							456				0.0586	0.62	0.19	0.43	0.00	0.00	0.00
1994	234	1200	115.5	29.4	86.1							371				0.0488	5.10	1.30	3.80	0.00	0.00	0.00
1994	235	1200	117.3	34.8	82.5							381.6				0.0488	4.95	1.47	3.48	0.00	0.00	0.00
1994	236	1200	136.2	51.8	84.4							434.6				0.0488	5.74	2.18	3.56	0.00	0.00	0.00
1994	237	1200	137.6	53.3	84.3							424				0.0488	5.80	2.25	3.55	0.00	0.00	0.00
1994	238	1200	136.9	47.1	89.8							388.5				0.0488	5.77	1.99	3.79	0.00	0.00	0.00
1994	239	1200	130.0	37.7	92.3							143.1				0.0488	5.48	1.59	3.89	0.00	0.00	0.00
1994	240	1200	104.5	27.9	76.6							484.5				0.0417	3.88	1.04	2.85	0.00	0.00	0.00
1994	241	1200	99.9	27.2	72.7							478.8				0.0417	3.60	0.98	2.62	0.00	0.00	0.00
1994	242	1200	105.5	25.4	80.1							490.2				0.0417	3.80	0.92	2.89	0.00	0.00	0.00
1994	243	1200	110.4	33.9	76.5							490.2				0.0417	3.98	1.22	2.76	0.00	0.00	0.00
1994	244	1200	97.1	23.7	73.4							501.6				0.0417	3.50	0.85	2.64	0.00	0.00	0.00
1994	245	1200	104.8	29.7	75.2							501.6				0.0417	3.78	1.07	2.71	0.00	0.00	0.00

Appendix E1

1	2	3	4	5	6	7	8	9	10	11.0	12	13	14	15	16	17	18	19	20	21	22	23
1994	246	0950	100.2	30.0	70.2							513				0.0417	3.23	0.97	2.27	0.00	0.00	0.00
1994	246	1200	147.7	60.9	86.8							501.6				0.0417	0.55	0.23	0.33	0.00	0.00	0.00
1994	247	0844	126.6	34.6	92.0							495.6				0.0811	5.62	1.53	4.08	0.00	0.00	0.00
1994	247	1200	94.3	24.7	69.6							401.2				0.0811	0.96	0.25	0.71	0.00	0.00	0.00
1994	247	1600	97.8	37.7	60.1							389.4				0.0627	1.01	0.39	0.62	0.00	0.00	0.00
1994	248	1200	99.2	36.0	63.2							389.4				0.0627	4.48	1.63	2.85	0.00	0.00	0.00
1994	249	1200	96.7	31.8	64.9							395.3				0.0627	5.24	1.72	3.52	0.00	0.00	0.00
1994	250	1200	117.8	46.5	71.3							401.2				0.0627	6.38	2.52	3.86	0.00	0.00	0.00
1994	251	1200	114.3	37.0	77.3							483.8				0.0627	6.19	2.01	4.19	0.00	0.00	0.00
1994	252	1200	115.0	38.4	76.6							483.8				0.0627	6.23	2.08	4.15	0.00	0.00	0.00
1994	253	1200	111.1	32.1	79.0							483.8				0.0627	6.02	1.74	4.28	0.00	0.00	0.00
1994	254	0940	105.2	37.0	68.1						10	525.1				0.0627	5.10	1.80	3.31	0.00	0.00	0.00
1994	254	1200	113.6	34.6	79.0							483.8				0.0627	0.64	0.20	0.45	0.00	0.00	0.00
1994	255	1200	102.5	33.2	69.3											0.0471	4.05	1.31	2.74	0.00	0.00	0.00
1994	256	1200	114.0	40.8	73.2											0.0471	4.64	1.66	2.98	0.00	0.00	0.00
1994	257	1200	110.0	38.6	71.4											0.0471	4.48	1.57	2.91	0.00	0.00	0.00
1994	258	1200	107.5	35.4	72.1											0.0471	4.37	1.44	2.93	0.00	0.00	0.00
1994	259	1200	102.5	30.7	71.8											0.0471	4.17	1.25	2.92	0.00	0.00	0.00
1994	260	1200	104.6	30.3	74.3											0.0471	4.26	1.23	3.02	0.00	0.00	0.00
1994	261	1100	94.9	31.4	63.5											0.0471	3.70	1.23	2.47	0.00	0.00	0.00
1994	261	1200	113.3	28.5	84.8											0.0471	0.19	0.05	0.14	0.00	0.00	0.00
1994	261	1200	96.3	29.3	67.0											0.0391	0.00	0.00	0.00	0.00	0.00	0.00
1994	261	1600	94.9	32.5	62.4											0.0391	0.53	0.18	0.35	0.00	0.00	0.00
1994	261	2000	92.0	32.1	59.9											0.0391	0.52	0.18	0.34	0.00	0.00	0.00
1994	262	0000	97.8	35.0	62.8											0.0391	0.55	0.20	0.35	0.00	0.00	0.00
1994	262	0400	106.8	34.3	72.5											0.0391	0.60	0.19	0.41	0.00	0.00	0.00
1994	262	0800	107.1	35.0	72.1											0.0391	0.60	0.20	0.41	0.00	0.00	0.00
1994	262	1200	90.8	31.9	58.9											0.0391	0.51	0.18	0.33	0.00	0.00	0.00
1994	263	1200	96.5	34.4	62.1											0.0391	3.26	1.16	2.10	0.00	0.00	0.00
1994	264	1200	90.1	27.2	62.8											0.0391	3.04	0.92	2.12	0.00	0.00	0.00
1994	265	1200	95.4	30.5	65.0											0.0391	3.22	1.03	2.19	0.00	0.00	0.00
1994	266	1200	108.0	40.1	67.9											0.0391	3.65	1.35	2.29	0.00	0.00	0.00
1994	267	1200	101.9	35.5	66.4											0.0391	3.44	1.20	2.24	0.00	0.00	0.00
1994	268	1200	99.7	29.4	70.3											0.0391	3.37	0.99	2.37	0.00	0.00	0.00
1994	269	1025	91.8	30.1	61.7					7.9						0.0391	2.91	0.95	1.96	0.00	0.00	0.00
1994	269	1200	112.3	43.0	69.3											0.0368	0.23	0.09	0.14	0.00	0.00	0.00
1994	270	1200	101.2	28.7	72.5											0.0368	3.22	0.91	2.31	0.00	0.00	0.00

Appendix E1

1	2	3	4	5	6	7	8	9	10	11.0	12	13	14	15	16	17	18	19	20	21	22	23
1994	271	1200	99.4	24.3	75.1											0.0368	3.16	0.77	2.39	0.00	0.00	0.00
1994	272	1200	98.3	28.3	70.0											0.0368	3.13	0.90	2.23	0.00	0.00	0.00
1994	273	1125	91.5	30.8	60.7					8.0	6	620				0.0424	2.98	1.00	1.97	0.00	0.00	0.00
1994	273	1200	94.4	28.3	66.1											0.0424	0.07	0.02	0.05	0.00	0.00	0.00
1994	274	1200	105.5	33.0	72.5											0.0424	3.86	1.21	2.66	0.00	0.00	0.00
1994	275	1200	120.6	50.2	70.4											0.0424	4.42	1.84	2.58	0.00	0.00	0.00
1994	276	1200	91.1	25.4	65.7											0.0424	3.34	0.93	2.41	0.00	0.00	0.00
1994	277	1200	109.8	39.4	70.4											0.0424	4.02	1.44	2.58	0.00	0.00	0.00
1994	278	1200	93.6	29.0	64.6											0.0424	3.43	1.06	2.37	0.00	0.00	0.00
1994	279	1200	94.7	26.5	68.2											0.0424	3.47	0.97	2.50	0.00	0.00	0.00
1994	280	1200	91.1	30.9	60.2											0.0473	3.84	1.30	2.53	0.00	0.00	0.00
1994	280	1340	82.9	28.7	54.2					8.1	6	550				0.0473	0.21	0.07	0.14	0.00	0.00	0.00
1994	281	1200	90.1	23.4	66.7											0.0473	3.45	0.90	2.56	0.00	0.00	0.00
1994	282	1200	79.4	22.0	57.4											0.0473	3.24	0.90	2.35	0.00	0.00	0.00
1994	283	1200	91.8	32.3	59.2											0.0473	3.74	1.32	2.42	0.00	0.00	0.00
1994	284	1200	93.6													0.0473	3.83	1.80	2.03	0.00	0.00	0.00
1994	285	1200	89.4	18.4	71.0											0.0473	3.65	0.75	2.90	0.00	0.00	0.00
1994	286	1200	85.8	20.9	64.9											0.0473	3.51	0.85	2.65	0.00	0.00	0.00
1994	287	1200	78.0	19.5	58.5											0.0473	3.19	0.80	2.39	0.00	0.00	0.00
1994	287	1435	74.4	20.9	53.5							483.6				0.0473	0.32	0.09	0.23	0.00	0.00	0.00
1994	288	1200	89.0	26.6	62.4											0.0505	3.27	0.98	2.29	0.00	0.00	0.00
1994	289	1200	81.5	22.7	58.8											0.0505	3.56	0.99	2.57	0.00	0.00	0.00
1994	290	1200	91.1	30.2	60.9											0.0505	3.97	1.32	2.66	0.00	0.00	0.00
1994	291	1200	88.6	19.5	69.1											0.0505	3.87	0.85	3.01	0.00	0.00	0.00
1994	292	1200	79.4													0.0505	3.46	1.63	1.84	0.00	0.00	0.00
1994	293	1200	86.9	18.1	68.8											0.0505	3.79	0.79	3.00	0.00	0.00	0.00
1994	294	1200	92.9	27.4	65.6											0.0505	4.05	1.19	2.86	0.00	0.00	0.00
1994	295	1200	67.1													0.0505	2.93	1.38	1.55	0.00	0.00	0.00
1994	295	1400	73.7	19.5	54.2						3					0.0505	0.27	0.07	0.20	0.00	0.00	0.00
1994	296	1200	68.5													0.0505	2.91	1.37	1.54	0.00	0.00	0.00
1994	297	1200	76.7													0.0505	3.35	1.57	1.77	0.00	0.00	0.00
1994	298	1200	75.6													0.0505	3.30	1.55	1.75	0.00	0.00	0.00
1994	299	1200	64.3													0.0505	2.81	1.32	1.49	0.00	0.00	0.00
1994	300	1200	70.3													0.0505	3.07	1.44	1.63	0.00	0.00	0.00
1994	301	1200	80.5													0.0505	3.51	1.65	1.86	0.00	0.00	0.00
1994	302	1200	88.3													0.0505	3.85	1.81	2.04	0.00	0.00	0.00
1994	303	1430	63.6	13.8	49.8							591.6				0.0443	2.88	0.62	2.25	0.00	0.00	0.00

Appendix E1

1	2	3	4	5	6	7	8	9	10	11.0	12	13	14	15	16	17	18	19	20	21	22	23
1994	304	1430														0.0443	0.00	0.00	0.00	0.00	0.00	0.00
1994	305																0.00	0.00	0.00	0.00	0.00	0.00
1994	306																0.00	0.00	0.00	0.00	0.00	0.00
1994	307																0.00	0.00	0.00	0.00	0.00	0.00
1994	308																0.00	0.00	0.00	0.00	0.00	0.00
1994	309																0.00	0.00	0.00	0.00	0.00	0.00
1994	310																0.00	0.00	0.00	0.00	0.00	0.00
1994	311																0.00	0.00	0.00	0.00	0.00	0.00
1994	312	1240	62.5	15.9	46.7					7.5	2	651.9				0.0443	21.36	5.42	15.94	0.00	0.00	0.00
1994	313																0.00	0.00	0.00	0.00	0.00	0.00
1994	314																0.00	0.00	0.00	0.00	0.00	0.00
1994	315																0.00	0.00	0.00	0.00	0.00	0.00
1994	316																0.00	0.00	0.00	0.00	0.00	0.00
1994	317																0.00	0.00	0.00	0.00	0.00	0.00
1994	318																0.00	0.00	0.00	0.00	0.00	0.00
1994	319	1220	56.2	20.5	35.7					7.6		710				0.0391	14.19	5.18	9.01	0.00	0.00	0.00
1995	74	1000																				
1995	75	1430	74.3	29.2	45.1											0.0701	5.34	2.10	3.25	0.00	0.00	0.00
1995	76	0950	70.7	24.9	45.8											0.0393	1.94	0.68	1.25	0.00	0.00	0.00
1995	76	1610	91.3	56.3	35.0					7.7		694				0.0581	1.21	0.75	0.46	0.00	0.00	0.00
1995	76	1745	72.5	44.0	28.5		490.1	106.0								0.0434	0.18	0.11	0.07	0.00	56.36	12.19
1995	77	1110	60.3	27.4	32.9		511.2	103.2								0.0393	1.49	0.68	0.81	0.00	12.61	2.55
1995	78	1220	65.0	21.2	43.8		491.9	93.3								0.0434	2.56	0.83	1.72	0.00	19.35	3.67
1995	78	1740	96.4	37.1	59.3		476.9	104.9								0.0581	1.07	0.41	0.66	0.00	5.32	1.17
1995	79	1400	84.8	27.4	57.4		454.1	107.9						77.25	0.28	0.0581	3.60	1.16	2.44	0.00	19.30	4.59
1995	80	1355	285.3	153.1	132.2		532.9	164.1								0.1204	29.57	15.87	13.70	0.00	55.23	17.01
1995	80	1757	304.1	169.3	134.8		522.6	147.1								0.2002	8.84	4.92	3.92	0.00	15.19	4.28
1995	81	1030	305.5	201.1	104.4		438.6	175.1								0.0701	12.72	8.37	4.35	0.00	18.26	7.29
1995	81	1524	295.5	189.7	105.8		437.4	184.9								0.0769	4.05	2.60	1.45	0.00	5.99	2.53
1995	82	1810	289.0	190.1	98.9											0.0581	16.17	10.63	5.53	0.00	0.00	0.00
1995	83	1400	285.2	184.4	100.9	156.7										0.0479	9.75	6.30	3.45	80.04	0.00	0.00
1995	84	1415	292.6	191.4	101.2	163.3										0.0581	14.83	9.70	5.13	8.28	0.00	0.00
1995	85	1415	253.1	154.7	98.4		459.5	110.4						66.84	1.45	0.0581	12.70	7.76	4.94	0.00	87.76	21.06
1995	86	1425	189.3	75.4	113.9											0.0393	6.48	2.58	3.90	0.00	0.00	0.00
1995	87	1425	142.0	48.5	93.5											0.0434	5.33	1.82	3.51	0.00	0.00	0.00
1995	88	1435	126.8	37.6	89.2											0.0479	5.28	1.57	3.72	0.00	0.00	0.00

Appendix E1

1	2	3	4	5	6	7	8	9	10	11.0	12	13	14	15	16	17	18	19	20	21	22	23
1995	89	1420	142.0	58.8	83.2											0.0479	5.81	2.41	3.41	0.00	0.00	0.00
1995	90	1550	168.3	61.4	106.8	54.6										0.0842	13.01	4.75	8.26	15.39	0.00	0.00
1995	91	1310	150.0	61.4	88.6	53.1										0.0638	7.35	3.01	4.34	2.60	0.00	0.00
1995	92	1330	137.1	54.6	82.5		337.2	98.4		8.1		544		51.36	0.51	0.0638	7.66	3.05	4.61	0.00	113.51	33.12
1995	93	1120	136.7	50.0	86.7											0.0610	6.55	2.40	4.16	0.00	0.00	0.00
1995	94	1405	108.4	31.7	76.7											0.0581	6.06	1.77	4.29	0.00	0.00	0.00
1995	95	1425	100.1	25.2	74.9											0.0479	4.20	1.06	3.14	0.00	0.00	0.00
1995	96	1440	98.7	34.7	64.0											0.0479	4.13	1.45	2.68	0.00	0.00	0.00
1995	97	1355	84.6	24.5	60.1											0.0479	3.39	0.98	2.41	0.00	0.00	0.00
1995	98															0.0000	0.00	0.00	0.00	0.00	0.00	0.00
1995	99															0.0000	0.00	0.00	0.00	0.00	0.00	0.00
1995	100	1420	88.8	31.9	57.0	23.8			273.6	7.5		564				0.0513	6.47	2.32	4.15	8.46	0.00	0.00
1995	101	1440	114.3	46.4	67.9		347.1	98.0								0.0581	5.81	2.36	3.45	0.00	121.96	34.43
1995	102	1345	112.5	46.5	66.0											0.0701	6.55	2.71	3.84	0.00	0.00	0.00
1995	103	1345	100.5	37.3	63.2											0.0638	5.54	2.06	3.48	0.00	0.00	0.00
1995	104															0.0000	0.00	0.00	0.00	0.00	0.00	0.00
1995	105	1430	124.2	60.0	64.2											0.0638	10.99	5.31	5.68	0.00	0.00	0.00
1995	106	1420	114.7	53.2	61.5		315.2	74.5				460		50.16	0.54	0.0638	6.28	2.91	3.37	0.00	80.87	19.11
1995	107	1505	98.1	34.8	63.3	15.6			231.7	7.6						0.0638	5.58	1.98	3.60	5.68	0.00	0.00
1995	108	1430	92.2	20.7	71.5											0.0638	4.96	1.11	3.85	0.00	0.00	0.00
1995	109	1525	84.2	20.0	64.2											0.0638	4.82	1.14	3.67	0.00	0.00	0.00
1995	110	1615	93.2	23.3	69.9											0.0638	5.32	1.33	3.99	0.00	0.00	0.00
1995	111	1400	93.2	25.7	67.5											0.0670	7.22	1.99	5.23	0.00	0.00	0.00
1995	112															0.0000	0.00	0.00	0.00	0.00	0.00	0.00
1995	113	1430	97.4	21.5	75.9	13.8	x	x					18.55	43.8	0.68	0.0687	9.46	2.09	7.37	5.20	0.00	0.00
1995	114	1420	99.7	23.8	75.9	14.1			192	7.5		226				0.0701	5.99	1.43	4.57	0.85	0.00	0.00
1995	115	1400	107.9	27.0	80.9											0.0701	6.44	1.61	4.83	0.00	0.00	0.00
1995	116	1430	95.4	21.6	73.8											0.0734	6.18	1.40	4.78	0.00	0.00	0.00
1995	117	1400	103.3	25.6	77.7		180.7	65.4								0.0638	5.58	1.38	4.20	0.00	131.62	47.64
1995	118	1255	111.2	27.0	84.2											0.0581	5.33	1.29	4.03	0.00	0.00	0.00
1995	119															0.0000	0.00	0.00	0.00	0.00	0.00	0.00
1995	120															0.0000	0.00	0.00	0.00	0.00	0.00	0.00
1995	121	1100	97.9	26.3	71.6	11.9	118.9	31.3	206.7	8.0		550				0.0619	7.87	2.11	5.76	4.56	24.42	6.43
1995	121	1200	111.9	29.5	82.4											0.0638	0.26	0.07	0.19	0.00	0.00	0.00
1995	122	1400	99.4	25.2	74.2								21.2	48.84	0.28	0.0638	5.97	1.51	4.46	0.00	0.00	0.00
1995	123	1200	92.7	18.1	74.6											0.0638	4.65	0.91	3.74	0.00	0.00	0.00
1995	123	1200	93.6	23.4	70.2											0.0638	0.02	0.01	0.02	0.00	0.00	0.00

Appendix E1

1	2	3	4	5	6	7	8	9	10	11.0	12	13	14	15	16	17	18	19	20	21	22	23
1995	124	1200	93.0	16.3	76.7											0.0638	5.11	0.89	4.21	0.00	0.00	0.00
1995	125	1200	85.6	17.4	68.2											0.0638	4.72	0.96	3.76	0.00	0.00	0.00
1995	125	1600	85.2	17.8	67.4											0.0638	0.78	0.16	0.62	0.00	0.00	0.00
1995	126	1120	100.8	19.5	81.3											0.0638	4.48	0.87	3.61	0.00	0.00	0.00
1995	126	1200	87.0	16.7	70.3											0.0686	0.14	0.03	0.12	0.00	0.00	0.00
1995	127	1200	102.9	23.8	79.1											0.0686	6.10	1.41	4.69	0.00	0.00	0.00
1995	127	1400	88.8	19.5	69.3											0.0734	0.49	0.11	0.38	0.00	0.00	0.00
1995	128	1200	106.9	35.9	71.0	9.0										0.0702	5.92	1.99	3.93	3.58	0.00	0.00
1995	128	1250	95.9	19.5	76.4	10.1			241.3	8.6						0.0669	0.19	0.04	0.15	0.02	0.00	0.00
1995	129	1200	89.5	22.5	67.0											0.0653	4.88	1.23	3.65	0.00	0.00	0.00
1995	129	1245	83.5	20.7	62.7		15.7	21.1						52.8	0.36	0.0638	0.14	0.04	0.11	0.00	7.16	9.61
1995	130	1120	91.3	23.6	67.7											0.0638	4.74	1.22	3.51	0.00	0.00	0.00
1995	130	1200	154.8	23.6	131.2											0.0609	0.23	0.03	0.19	0.00	0.00	0.00
1995	131	1200	170.4	25.7	144.7											0.0609	8.97	1.35	7.61	0.00	0.00	0.00
1995	131	1610	99.2	30.4	68.8											0.0581	0.86	0.26	0.60	0.00	0.00	0.00
1995	132	1200	220.3	25.0	195.3											0.0581	9.13	1.04	8.10	0.00	0.00	0.00
1995	132	1415	93.4	30.7	62.7											0.0581	0.44	0.14	0.29	0.00	0.00	0.00
1995	133	1200	187.6	24.3	163.3											0.0581	8.53	1.10	7.42	0.00	0.00	0.00
1995	133	1430	185.5	23.2	162.3											0.0581	0.97	0.12	0.85	0.00	0.00	0.00
1995	134	1212	176.3	29.3	147.0											0.0609	8.39	1.39	7.00	0.00	0.00	0.00
1995	135	0943	106.2	27.8	78.4	14.7			172.7	8.2		507				0.0638	5.25	1.38	3.87	5.35	0.00	0.00
1995	135	1212	237.1	29.6	207.5											0.0609	1.29	0.16	1.13	0.00	0.00	0.00
1995	136	1422	91.5	26.1	65.4		17.9	23.6						57.48	0.36	0.0581	5.00	1.43	3.58	0.00	6.61	8.71
1995	137	1200	176.3	26.1	150.2											0.0609	8.37	1.24	7.13	0.00	0.00	0.00
1995	138	1410	85.4	28.9	56.5											0.0638	5.13	1.74	3.40	0.00	0.00	0.00
1995	139	1200	155.9	27.5	128.4											0.0609	7.47	1.32	6.15	0.00	0.00	0.00
1995	139	1400	83.6	26.8	56.8											0.0581	0.35	0.11	0.24	0.00	0.00	0.00
1995	140	1200	198.1	27.1	171.0											0.0609	9.56	1.31	8.25	0.00	0.00	0.00
1995	140	1500	86.5	28.2	58.3		18.1	23.1			12					0.0638	0.60	0.19	0.40	0.00	3.89	4.97
1995	141	1200	168.4	28.6	139.8											0.0609	7.76	1.32	6.44	0.00	0.00	0.00
1995	141	1600	84.0	26.4	57.6											0.0581	0.70	0.22	0.48	0.00	0.00	0.00
1995	142	1200	179.1	27.6	151.5							442				0.0581	7.49	1.15	6.33	0.00	0.00	0.00
1995	142	1430	103.0	19.4	83.6	9.8			260.5	8.0		528				0.0581	0.54	0.10	0.44	3.69	0.00	0.00
1995	143	0115	97.4	34.6	62.8		8.4	35.8						63.6	0.31	0.0581	2.19	0.78	1.41	0.00	1.04	4.44
1995	143	1200	181.7	24.2	157.5											0.0581	4.09	0.54	3.54	0.00	0.00	0.00
1995	144	1200	89.2	22.4	66.8											0.0581	4.48	1.12	3.35	0.00	0.00	0.00
1995	144	1300	104.8	26.1	78.7											0.0581	0.22	0.05	0.16	0.00	0.00	0.00

Appendix E1

1	2	3	4	5	6	7	8	9	10	11.0	12	13	14	15	16	17	18	19	20	21	22	23
1995	145	1200	133.4	2.0	131.4											0.0581	6.42	0.10	6.32	0.00	0.00	0.00
1995	146	1200	113.0	22.0	91.0											0.0581	5.67	1.10	4.57	0.00	0.00	0.00
1995	147	1100	90.0	25.0	65.0		1.3	24.5								0.0581	4.33	1.20	3.12	0.00	0.29	5.42
1995	147	1200	109.6	27.2	82.4	11.5						590				0.0581	0.23	0.06	0.17	2.83	0.00	0.00
1995	148															0.0000	0.00	0.00	0.00	0.00	0.00	0.00
1995	149	1415	87.7	23.5	64.2				280.1	8.3						0.1377	7.01	1.88	5.13	0.00	0.00	0.00
1995	150	1310	106.3	23.5	82.8						18.5					0.0554	5.07	1.12	3.95	0.00	0.00	0.00
1995	151	1354	107.1	19.2	87.9		0.1	4.6			17			65.52	0.16	0.0503	4.60	0.82	3.77	0.00	0.02	0.91
1995	152	1200	132.7	11.5	121.2											0.0542	5.72	0.50	5.22	0.00	0.00	0.00
1995	152	1400	106.3	12.5	93.8											0.0581	0.44	0.05	0.39	0.00	0.00	0.00
1995	153	1200	130.9	10.4	120.5											0.0581	6.02	0.48	5.54	0.00	0.00	0.00
1995	153	1500	113.4	12.5	100.9		x	x			19	616		68.8	0.22	0.0581	0.71	0.08	0.63	0.00	0.00	0.00
1995	154	1000	135.2	19.5	115.7	11.3	2.0	4.3				594		72.6	0.17	0.0580	5.36	0.77	4.59	3.78	0.28	0.60
1995	154	1200	201.2	13.2	188.0											0.0669	0.97	0.06	0.91	0.00	0.00	0.00
1995	154	1200	153.1	13.6	139.5												0.00	0.00	0.00	0.00	0.00	0.00
1995	154	1420	139.4	20.9	118.5	11.3	1.1	2.3	282.3	8.1		611		67.7	0.2	0.0843	0.99	0.15	0.84	0.13	0.01	0.03
1995	154	1600	130.6	15.7	114.9											0.0830	0.65	0.08	0.57	0.00	0.00	0.00
1995	154	2000	125.0	16.4	108.6											0.0922	1.66	0.22	1.44	0.00	0.00	0.00
1995	154	2000	123.6	14.6	109.0	4.5	1.3	x				574		69.1	0.14		0.00	0.00	0.00	0.08	0.02	0.00
1995	155	0000	116.4	19.5	96.9											0.0862	1.45	0.24	1.20	0.00	0.00	0.00
1995	155	1355	108.8	20.6	88.2	9.1	0.3	x								0.0744	4.06	0.77	3.29	0.45	0.01	0.00
1995	156	1200	127.7	20.9	106.8											0.0698	7.09	1.16	5.93	0.00	0.00	0.00
1995	156	1410	103.3	25.7	77.6	10.5			289.9	8.2						0.0589	0.47	0.12	0.36	0.63	0.00	0.00
1995	157	1200	146.6	24.2	122.4											0.0636	7.33	1.21	6.12	0.00	0.00	0.00
1995	158	1300	154.3	23.9	130.4											0.0581	7.74	1.20	6.54	0.00	0.00	0.00
1995	158	1300	110.2	27.5	82.7		1.8	1.0			16			75.5	0.34	0.0554	0.22	0.05	0.16	0.00	0.29	0.16
1995	159	1200	141.2	29.0	112.2											0.0555	6.49	1.33	5.16	0.00	0.00	0.00
1995	160	1200	133.9	32.2	101.7											0.0528	6.10	1.47	4.64	0.00	0.00	0.00
1995	161	1200	138.6	32.2	106.4											0.0550	6.58	1.53	5.05	0.00	0.00	0.00
1995	161	1220	103.6	37.0	66.6						17					0.0503	0.06	0.02	0.04	0.00	0.00	0.00
1995	162	1200	114.3	49.2	65.1											0.0491	4.78	2.06	2.72	0.00	0.00	0.00
1995	163	1200	137.7	50.0	87.7											0.0491	5.34	2.12	3.72	0.00	0.00	0.00
1995	163	1351	111.0	55.1	55.9	22.1	33.1	25.6	310.1	8.4	18	671				0.0479	0.35	0.18	0.18	7.27	7.52	5.81
1995	164	1200	126.0	40.1	85.9											0.0506	5.08	1.62	3.47	0.00	0.00	0.00
1995	164	1400	148.0	56.9	91.0		28.2	17.5								0.0534	0.57	0.22	0.35	0.00	1.25	0.77
1995	164	1600	164.8	38.3	126.5											0.0595	0.71	0.16	0.54	0.00	0.00	0.00
1995	164	2000	134.1	32.8	101.3											0.0679	1.31	0.32	0.99	0.00	0.00	0.00

Appendix E1

1	2	3	4	5	6	7	8	9	10	11.0	12	13	14	15	16	17	18	19	20	21	22	23
1995	165	0000	143.2	38.3	104.9											0.0685	1.41	0.38	1.03	0.00	0.00	0.00
1995	165	0400	146.5	41.6	104.9											0.0685	1.44	0.41	1.03	0.00	0.00	0.00
1995	165	0800	119.1	36.4	82.7											0.0679	1.16	0.36	0.81	0.00	0.00	0.00
1995	165	1200	117.6	36.4	81.2											0.0638	1.08	0.33	0.75	0.00	0.00	0.00
1995	165	1700	90.2	39.7	50.5					8.2	18			75.5	0.12	0.0626	1.04	0.46	0.58	0.00	0.00	0.00
1995	166	1200	143.9	33.5	110.4						19	363				0.0671	6.57	1.53	5.04	0.00	0.00	0.00
1995	166	1415	99.7	39.4	60.3											0.0558	0.45	0.18	0.27	0.00	0.00	0.00
1995	167	2115	180.5	43.4	137.1	27.3	55.3	47.2				286		72.05	0.6	0.0606	12.20	2.93	9.27	6.18	6.51	5.56
1995	168	0830	96.1	34.9	61.2	24.0	47.6	62.7				597		94.6	0.29	0.0796	3.09	1.12	1.97	0.77	1.53	2.01
1995	168	1300	103.9	36.3	67.6	28.8	34.9	45.2	293.4	8.1				64.9	0.32	0.0895	1.52	0.53	0.99	0.42	0.51	0.66
1995	168	1550	106.8	35.4	71.4	22.4	34.7	49.8				549		87.12	0.07	0.0941	1.39	0.46	0.93	0.29	0.45	0.65
1995	168	2125	97.8	28.8	69.0	34.9	28.7	37.5				573		90.2	0.1	0.1183	1.91	0.56	1.35	0.68	0.56	0.73
1995	169	1030	96.4	37.3	59.1	23.2	36.7	37.2				590		73.5	0.36	0.1131	5.14	1.99	3.15	1.24	1.95	1.98
1995	169	1508	96.8	36.9	59.8	20.7	33.9	39.3		8.1		697		78.6	0.4	0.0937	1.51	0.58	0.94	0.32	0.53	0.61
1995	169	2000	97.8	39.1	58.7	23.2	34.1	30.6				578		81.1	0.45	0.0985	1.69	0.67	1.01	0.40	0.59	0.53
1995	170	0845	85.0	32.5	52.5	23.6	35.5	31.5			15	588		82.1	0.44	0.0834	3.26	1.24	2.01	0.90	1.36	1.21
1995	170	1940	85.3	30.6	54.7	26.5	35.5	20.5				560		83.4	0.39	0.0798	2.67	0.96	1.71	0.83	1.11	0.64
1995	171	0930	86.4	37.2	49.2	29.0	34.6	20.2		8.3		510		95.6	0.48	0.0923	3.98	1.71	2.26	1.34	1.59	0.93
1995	171	1939	86.4	34.7	51.8	23.8	33.0	20.8	269.8	8.2		551		91.4	0.36	0.0831	2.62	1.05	1.57	0.72	1.00	0.63
1995	172	0944	94.3	42.9	51.4	23.8	30.7	27.8				580		76.3	0.38	0.0822	3.93	1.79	2.14	0.99	1.28	1.16
1995	172	1930	89.4	40.4	49.0	32.2										0.0805	2.53	1.14	1.39	0.91	0.00	0.00
1995	173	1110	91.9	40.1	51.7	36.0	31.8	34.3						80.3	0.43	0.0778	4.03	1.76	2.27	1.58	2.30	2.48
1995	174	1253	94.8	29.4	65.4	18.7	26.3	42.3								0.0799	7.01	2.18	4.83	1.38	1.94	3.13
1995	175	1430	95.0	38.7	56.3	18.6	18.2	18.9								0.0794	6.96	2.83	4.12	1.36	1.33	1.38
1995	176	1500	82.7	31.2	51.5	21.0	9.7	19.3			18					0.0787	5.74	2.16	3.57	1.46	0.67	1.34
1995	177	1455	118.3	40.2	78.1	22.8	29.1	30.9				500				0.2226	22.68	7.71	14.97	4.37	5.58	5.92
1995	178	0937	108.2	35.9	72.3	24.6	29.0	50.1	236.6	8.0		488				0.1299	9.46	3.14	6.32	2.15	2.54	4.38
1995	179	1400	110.3	55.6	54.7											0.1092	12.31	6.20	6.10	0.00	0.00	0.00
1995	179	1930														0.0000	0.00	0.00	0.00	0.00	0.00	0.00
1995	179	2000	139.9	36.7	103.2											0.1055	0.27	0.07	0.20	0.00	0.00	0.00
1995	180	0000	105.6	37.4	68.2											0.1102	1.68	0.59	1.08	0.00	0.00	0.00
1995	180	0400	105.2	34.9	70.3											0.1102	1.67	0.55	1.12	0.00	0.00	0.00
1995	180	0800	112.9	38.9	74.0											0.1102	1.79	0.62	1.17	0.00	0.00	0.00
1995	180	1200	110.7	37.8	72.9											0.1021	1.63	0.56	1.07	0.00	0.00	0.00
1995	180	1441	99.4	40.0	59.4					8.0						0.0940	0.90	0.36	0.54	0.00	0.00	0.00
1995	181	1200	140.2	58.7	81.5											0.0366	3.94	1.65	2.29	0.00	0.00	0.00
1995	181	1415	118.1	50.1	68.0											0.0890	0.86	0.36	0.49	0.00	0.00	0.00

Appendix E1

1	2	3	4	5	6	7	8	9	10	11.0	12	13	14	15	16	17	18	19	20	21	22	23
1995	182	1200	120.3	46.1	74.2											0.0875	8.23	3.16	5.08	0.00	0.00	0.00
1995	182	1430	124.6	49.7	74.9		27.9	24.8			15			55.5	0.78	0.0922	1.03	0.41	0.62	0.00	8.87	7.88
1995	183	1200	111.6	40.6	71.0											0.0898	7.76	2.82	4.94	0.00	0.00	0.00
1995	183	1455	110.9	49.7	61.2											0.0680	1.02	0.46	0.57	0.00	0.00	0.00
1995	184	1200	111.3	39.7	71.6											0.0960	8.11	2.89	5.21	0.00	0.00	0.00
1995	185	1200	111.3	52.3	59.0											0.0962	9.25	4.35	4.90	0.00	0.00	0.00
1995	185	1200	126.7	50.5	76.2	36.0	39.6	25.5	204	7.9		469					0.00	0.00	0.00	19.88	9.30	5.99
1995	186	0937	137.0	71.6	65.4									52.8	0.68	0.1030	10.98	5.74	5.24	0.00	0.00	0.00
1995	186	1200	109.5	43.0	66.5											0.1058	0.99	0.39	0.60	0.00	0.00	0.00
1995	187	1200	110.2	51.5	58.7											0.1032	9.83	4.59	5.24	0.00	0.00	0.00
1995	187	1415	108.8	56.2	52.6					8.1		456				0.0897	0.79	0.41	0.38	0.00	0.00	0.00
1995	188	1108	104.8	49.4	55.4											0.1000	7.86	3.71	4.15	0.00	0.00	0.00
1995	188	1200	97.0	42.7	54.3											0.1006	0.32	0.14	0.18	0.00	0.00	0.00
1995	189	1200	111.3	47.3	64.0											0.0854	8.21	3.49	4.72	0.00	0.00	0.00
1995	190	1120	110.9	47.7	63.2	35.3	36.8	24.4	203.2	7.9				54.3	0.76	0.0772	7.19	3.09	4.10	14.21	14.82	9.83
1995	190	1200	108.8	46.9	61.9											0.0692	0.18	0.08	0.10	0.00	0.00	0.00
1995	191	1200	113.8	48.4	65.4											0.1001	9.85	4.19	5.66	0.00	0.00	0.00
1995	192	1010	128.0	55.9	72.1							440				0.0964	9.85	4.30	5.55	0.00	0.00	0.00
1995	192	1200	114.5	44.1	70.4											0.1101	0.83	0.32	0.51	0.00	0.00	0.00
1995	193															0.0000	0.00	0.00	0.00	0.00	0.00	0.00
1995	194	0930	126.8	52.1	74.7											0.0981	20.38	8.38	12.00	0.00	0.00	0.00
1995	195															0.0000	0.00	0.00	0.00	0.00	0.00	0.00
1995	196	1133	124.3	46.7	77.6											0.0780	17.48	6.57	10.91	0.00	0.00	0.00
1995	197	1200	137.9	39.2	98.7											0.0769	9.33	2.65	6.68	0.00	0.00	0.00
1995	198	1045	111.4	50.3	61.1	35.0	18.8	38.5	202	7.8		456		52.6	0.76	0.0734	6.70	3.02	3.67	21.04	11.31	23.16
1995	198	1200	152.3	44.6	107.7											0.0734	0.50	0.15	0.36	0.00	0.00	0.00
1995	199	1200	99.5	39.1	60.4											0.0772	6.64	2.61	4.03	0.00	0.00	0.00
1995	200	1038	103.1	47.0	56.1											0.0729	6.12	2.79	3.33	0.00	0.00	0.00
1995	200	1200	131.9	43.4	88.5											0.0751	0.49	0.16	0.33	0.00	0.00	0.00
1995	201	1200	139.8	42.4	97.4											0.0779	9.41	2.85	6.56	0.00	0.00	0.00
1995	202	1216	108.9	47.8	61.1											0.0753	6.57	2.89	3.69	0.00	0.00	0.00
1995	202	1200	134.4	48.5	85.9											0.0789	0.66	0.24	0.42	0.00	0.00	0.00
1995	203	1200	127.2	42.4	84.8											0.0686	7.54	2.51	5.02	0.00	0.00	0.00
1995	204	1200	129.0	34.8	94.2											0.0767	8.55	2.31	6.24	0.00	0.00	0.00
1995	205	1000	105.3	47.8	57.5	36.2	20.4	22.0	229.4	8.0		447		????	0.44	0.0859	7.16	3.25	3.91	16.63	9.37	10.10
1995	205	1200	134.1	42.0	92.1											0.0842	0.81	0.25	0.56	0.00	0.00	0.00
1995	206	1200	119.4	38.8	80.6											0.0842	8.69	2.82	5.87	0.00	0.00	0.00

Appendix E1

1	2	3	4	5	6	7	8	9	10	11.0	12	13	14	15	16	17	18	19	20	21	22	23
1995	207	0942	110.3	42.4	67.9											0.0836	7.20	2.77	4.43	0.00	0.00	0.00
1995	207	1200	120.1	45.7	74.4											0.0980	0.97	0.37	0.60	0.00	0.00	0.00
1995	208	1200	140.2	43.9	96.3											0.0960	11.62	3.64	7.98	0.00	0.00	0.00
1995	209	1000	99.0	46.8	52.2											0.0936	7.34	3.47	3.87	0.00	0.00	0.00
1995	209	1200	161.4	43.2	118.2											0.0902	1.05	0.28	0.77	0.00	0.00	0.00
1995	210	1200	108.5	45.0	63.5											0.0902	8.45	3.51	4.95	0.00	0.00	0.00
1995	211	1200	120.5	37.0	83.5											0.0902	9.39	2.89	6.50	0.00	0.00	0.00
1995	212	1024	104.8	64.3	40.5	32.9	27.8	21.6	216.4	8.1		515		59.2	0.78	0.0906	7.66	4.70	2.96	17.90	15.14	11.77
1995	212	1200	115.4	39.3	76.1											0.0845	0.56	0.19	0.37	0.00	0.00	0.00
1995	213	1200	118.7	41.5	77.2											0.0904	9.28	3.24	6.03	0.00	0.00	0.00
1995	214	1018	108.2	49.8	58.4											0.0928	8.06	3.71	4.35	0.00	0.00	0.00
1995	214	1200	120.5	43.3	77.2											0.0796	0.59	0.21	0.38	0.00	0.00	0.00
1995	215	1200	121.0	48.2	72.8											0.0902	9.43	3.76	5.67	0.00	0.00	0.00
1995	216	1000	104.8	51.1	53.7											0.0884	7.34	3.58	3.76	0.00	0.00	0.00
1995	216	1200	154.5	52.6	101.9											0.0842	0.94	0.32	0.62	0.00	0.00	0.00
1995	217	1200	108.5	44.2	64.3											0.0828	7.77	3.16	4.60	0.00	0.00	0.00
1995	218	1200	107.0	51.9	55.1											0.0842	7.79	3.78	4.01	0.00	0.00	0.00
1995	219	1026	124.7	57.8	66.9	42.4	25.0	37.6	208.9	8.1		497		57.5	0.97	0.0889	8.95	4.15	4.80	22.55	13.31	20.02
1995	219	1200	226.5	45.3	181.2											0.0863	1.10	0.22	0.88	0.00	0.00	0.00
1995	219	1600	122.5	47.1	75.4											0.0902	1.59	0.61	0.98	0.00	0.00	0.00
1995	219	2000	165.5	48.2	117.3											0.0902	2.15	0.63	1.52	0.00	0.00	0.00
1995	220	0000	175.0	53.7	121.3											0.0925	2.33	0.72	1.62	0.00	0.00	0.00
1995	220	0400	324.7	39.8	284.9											0.1023	4.78	0.59	4.20	0.00	0.00	0.00
1995	220	0800	597.8	42.3	555.5											0.1119	9.63	0.68	8.95	0.00	0.00	0.00
1995	220	0900	221.4	57.0	164.4	46.6	27.2	28.0				410		51.7	0.95	0.7943	6.33	1.63	4.70	4.83	2.82	2.90
1995	220	1200	499.4	42.7	456.7											5.3039	286.06	24.46	261.61	0.00	0.00	0.00
1995	220	1500	407.7	50.8	356.9	31.9	60.6	24.5				401		53.3	0.88	31.1972	1373.66	171.16	1202.50	125.60	238.89	96.58
1995	220	1600	337.5	51.5	286.0											18.4049	223.62	34.12	189.50	0.00	0.00	0.00
1995	220	2000	462.5	55.6	406.9											3.6817	245.20	29.48	215.72	0.00	0.00	0.00
1995	221	0933	269.9	58.5	211.4	43.9	46.5	20.7				353		43.3	1.28	2.0783	273.63	59.31	214.32	96.87	102.60	45.68
1995	221	1430	291.7	71.1	220.6	41.8	38.6	15.4	129.9	8.0		260		37.8	1.23	1.8618	96.78	23.59	73.19	13.87	12.81	5.11
1995	221	2000	284.6	74.0	210.6											1.9909	112.19	29.17	83.02	0.00	0.00	0.00
1995	222	0000	315.0	68.2	246.8											1.7700	80.29	17.38	62.91	0.00	0.00	0.00
1995	222	0400	308.2	72.9	235.3											1.4755	65.48	15.49	49.99	0.00	0.00	0.00
1995	222	0800	230.7	63.2	167.5											1.3614	45.23	12.39	32.84	0.00	0.00	0.00
1995	222	1225	145.4	60.0	85.4	38.2	15.1	18.6				178		26.1	0.97	1.3996	17.70	7.31	10.40	45.05	17.81	21.94
1995	222	1500	149.1	52.5	96.6											1.2712	31.27	11.01	20.26	0.00	0.00	0.00

Appendix E1

1	2	3	4	5	6	7	8	9	10	11.0	12	13	14	15	16	17	18	19	20	21	22	23
1995	222	1535	129.9	57.8	72.1	32.8	16.0	62.1				220		26	0.85	0.6897	3.01	1.34	1.67	7.64	3.73	14.46
1995	222	1700	141.5	49.7	91.8											1.8106	9.84	3.46	6.38	0.00	0.00	0.00
1995	222	2200	151.2	50.7	100.5											1.2562	34.19	11.46	22.73	0.00	0.00	0.00
1995	223	0300	159.5	49.3	110.2											1.1374	32.66	10.09	22.56	0.00	0.00	0.00
1995	223	0800	157.4	49.3	108.1											1.0530	29.83	9.34	20.49	0.00	0.00	0.00
1995	223	1015	130.3	68.6	61.7	29.6	16.6	24.3				194		27.1	0.75	0.9360	9.88	5.20	4.68	22.67	12.71	18.61
1995	223	1200	127.1	49.1	78.0											1.0863	8.70	3.36	5.34	0.00	0.00	0.00
1995	223	1700	117.9	48.8	69.1											0.9506	20.17	8.35	11.82	0.00	0.00	0.00
1995	223	2200	122.9	44.2	78.7											0.9506	21.03	7.56	13.47	0.00	0.00	0.00
1995	224	0300	115.8	45.9	69.9											0.9458	19.71	7.81	11.90	0.00	0.00	0.00
1995	224	0800	118.6	44.9	73.7											0.9027	19.27	7.30	11.98	0.00	0.00	0.00
1995	224	0930	114.4	49.5	64.9	31.6	18.9	23.6	94.86	7.6		189		29.9	0.65	0.9027	5.58	2.41	3.16	25.03	14.97	18.69
1995	224	1200	110.4	44.2	66.2											0.9027	8.97	3.59	5.38	0.00	0.00	0.00
1995	224	1700	99.1	46.7	52.4											0.9027	16.10	7.59	8.51	0.00	0.00	0.00
1995	224	2200	99.8	47.0	52.8											0.8570	15.40	7.25	8.15	0.00	0.00	0.00
1995	225	0300	105.8	45.2	60.6											0.8527	16.24	6.94	9.30	0.00	0.00	0.00
1995	225	0800	97.7	47.0	50.7											0.7884	13.86	6.67	7.19	0.00	0.00	0.00
1995	225	1019	108.0	58.7	49.3	32.2	16.9	27.6		7.7		224		30.3	0.67	0.8778	7.91	4.30	3.61	24.68	12.96	21.16
1995	225	1200	98.4	50.9	47.5											0.6877	4.10	2.12	1.98	0.00	0.00	0.00
1995	225	1700	106.9	60.8	46.1											0.7892	15.19	8.64	6.55	0.00	0.00	0.00
1995	225	2200	110.8	55.2	55.6											0.7518	14.99	7.47	7.52	0.00	0.00	0.00
1995	226	0300	104.4	56.9	47.5											0.7319	13.75	7.50	6.26	0.00	0.00	0.00
1995	226	0800	115.0	60.1	54.9											0.7130	14.76	7.71	7.05	0.00	0.00	0.00
1995	226	0950	105.1	52.3	52.8	33.6	18.5	26.4				246		31.5	0.61	0.7571	5.25	2.61	2.64	21.14	11.64	16.61
1995	226	1200	98.5	52.0	46.5											0.6406	4.92	2.60	2.32	0.00	0.00	0.00
1995	226	1700	108.7	61.2	47.5											0.6687	13.08	7.37	5.72	0.00	0.00	0.00
1995	226	2200	117.3	52.4	64.9											0.6578	13.89	6.20	7.68	0.00	0.00	0.00
1995	227	0300	107.0	61.2	45.8											0.6543	12.60	7.21	5.39	0.00	0.00	0.00
1995	227	0800	116.9	64.1	52.8											0.6267	13.19	7.23	5.96	0.00	0.00	0.00
1995	227	1010	97.8	52.7	45.1	32.6	21.7	30.4				272		32.2	0.66	0.5753	4.39	2.36	2.02	18.39	12.24	17.15
1995	227	1200	102.9	45.6	57.3											0.6273	4.26	1.89	2.37	0.00	0.00	0.00
1995	227	1700	97.5	49.2	48.3											0.5590	9.81	4.95	4.86	0.00	0.00	0.00
1995	227	2200	102.5	51.7	50.8											0.5590	10.31	5.20	5.11	0.00	0.00	0.00
1995	228	0300	105.4	52.4	53.0											0.5182	9.83	4.89	4.94	0.00	0.00	0.00
1995	228	0800	102.2	54.5	47.7											0.4795	8.82	4.70	4.12	0.00	0.00	0.00
1995	228	1045	95.4	52.7	42.7	36.4	21.1	21.0				334		33.9	0.75	0.4551	4.30	2.37	1.92	17.01	9.86	9.81
1995	228	1200	91.3	49.8	41.5											0.6008	2.47	1.35	1.12	0.00	0.00	0.00

Appendix E1

1	2	3	4	5	6	7	8	9	10	11.0	12	13	14	15	16	17	18	19	20	21	22	23
1995	228	1700	89.9	48.4	41.5											0.4542	7.35	3.96	3.39	0.00	0.00	0.00
1995	228	2200	98.4	49.4	49.0											0.4186	7.41	3.72	3.69	0.00	0.00	0.00
1995	229	0300	105.1	52.6	52.5											0.3776	7.14	3.58	3.57	0.00	0.00	0.00
1995	229	0800	97.0	51.2	45.8											0.3776	6.59	3.48	3.11	0.00	0.00	0.00
1995	229	1223	104.0	54.4	49.7	37.8	28.2	25.0	115.5	8.1		356		38.4	0.71	0.4057	3.62	1.89	1.73	13.41	10.01	8.87
1995	230	1200	92.8	50.8	42.0											0.3400	29.10	15.93	13.17	0.00	0.00	0.00
1995	231	1200	106.8	52.9	53.9											0.3175	29.30	14.51	14.78	0.00	0.00	0.00
1995	231	1350	94.2	61.0	33.2					7.8		360		37.5	0.88	0.3265	2.03	1.31	0.72	0.00	0.00	0.00
1995	232	1200	99.8	54.5	45.3											0.3024	24.08	13.15	10.93	0.00	0.00	0.00
1995	233	1049	99.4	58.0	41.4		39.5	32.1				336				0.3017	24.64	14.38	10.26	0.00	43.39	35.26
1995	233	1200	98.7	58.8	40.0											0.2529	1.06	0.63	0.43	0.00	0.00	0.00
1995	234	1030	102.9	60.9	42.0	49.5			131.9	7.75(8.07)		342				0.2554	21.29	12.60	8.69	65.15	0.00	0.00
1995	234	1200	102.6	65.1	37.5											0.2357	1.31	0.33	0.48	0.00	0.00	0.00
1995	235	1030	118.8	62.4	56.5											0.2546	24.50	12.86	11.64	0.00	0.00	0.00
1995	235	1200	106.7	59.5	47.2											0.2173	1.25	0.70	0.55	0.00	0.00	0.00
1995	236	1200	107.0	63.1	43.9											0.2173	20.09	11.85	8.24	0.00	0.00	0.00
1995	237	1020	109.6	68.9	40.7											0.2084	18.37	11.55	6.82	0.00	0.00	0.00
1995	237	1200	109.9	67.4	42.5											0.1802	1.19	0.73	0.46	0.00	0.00	0.00
1995	238	1200	106.7	67.0	39.7											0.1926	17.75	11.15	6.61	0.00	0.00	0.00
1995	239	1200	111.3	66.3	45.0											0.1843	17.72	10.56	7.17	0.00	0.00	0.00
1995	240	1030	114.9	74.9	40.0	54.9	47.1	19.2	147.8	8.0		312		44.7	1.22	0.1843	17.15	11.18	5.97	58.84	60.73	24.76
1995	240	1200	113.5	70.6	42.9											0.1843	1.13	0.70	0.43	0.00	0.00	0.00
1995	241	1200	108.8	66.6	42.2											0.1689	15.87	9.72	6.16	0.00	0.00	0.00
1995	242	1020	113.4	70.5	42.9											0.1661	15.15	9.42	5.73	0.00	0.00	0.00
1995	242	1200	108.8	67.6	41.2											0.1417	0.92	0.57	0.35	0.00	0.00	0.00
1995	243	1200	105.9	66.9	39.0											0.1558	14.26	9.01	5.25	0.00	0.00	0.00
1995	244	1035	113.4	69.8	43.6											0.1476	13.61	8.38	5.23	0.00	0.00	0.00
1995	244	1200	110.6	69.8	40.8											0.1515	0.85	0.54	0.32	0.00	0.00	0.00
1995	245	1200	97.4	62.4	35.0											0.1424	11.98	7.68	4.31	0.00	0.00	0.00
1995	246	1200	105.8	56.1	49.7											0.1367	12.50	6.63	5.87	0.00	0.00	0.00
1995	247	1030	109.1	68.0	41.1	54.7	35.9	17.8	174.5	7.9		314		50.5		0.1311	11.58	7.22	4.36	49.64	32.58	16.15
1995	247	1200	109.2	61.3	47.9											0.1204	0.71	0.40	0.31	0.00	0.00	0.00
1995	248	1200	103.3	61.7	41.6											0.1204	10.74	6.42	4.33	0.00	0.00	0.00
1995	249	1200	102.6	61.3	41.3											0.1204	10.67	6.38	4.30	0.00	0.00	0.00
1995	250	1000	111.7	64.4	47.3											0.1204	10.65	6.14	4.51	0.00	0.00	0.00
1995	250	1200	109.2	62.4	46.8											0.1102	0.87	0.50	0.37	0.00	0.00	0.00
1995	251	1200	107.5	60.5	47.0											0.1102	10.24	5.76	4.48	0.00	0.00	0.00

Appendix E1

1	2	3	4	5	6	7	8	9	10	11.0	12	13	14	15	16	17	18	19	20	21	22	23
1995	252	1200	98.5	55.3	43.2											0.1044	8.88	4.99	3.90	0.00	0.00	0.00
1995	253	1200	104.7	49.1	55.6											0.0973	8.80	4.13	4.67	0.00	0.00	0.00
1995	254	1000	109.9	57.8	52.1	45.6	45.8	8.5	209.2	7.9	13.2	330		55.9		0.0922	8.03	4.22	3.81	30.11	30.24	5.61
1995	254	1200	110.9													0.0922	0.74	0.00	0.00	0.00	0.00	0.00
1995	255	1200	100.9	51.5	49.4											0.0922	8.04	4.10	3.94	0.00	0.00	0.00
1995	256	1200	100.2	50.5	49.7											0.0922	7.99	4.02	3.96	0.00	0.00	0.00
1995	257	1020	102.0	54.0	48.0											0.0929	7.62	4.03	3.59	0.00	0.00	0.00
1995	257	1200	100.9	50.5	50.4											0.0830	0.50	0.25	0.25	0.00	0.00	0.00
1995	258	1200	96.4	43.9	52.5											0.0922	7.68	3.50	4.18	0.00	0.00	0.00
1995	259	1200	94.0	43.3	50.7											0.0922	7.49	3.45	4.04	0.00	0.00	0.00
1995	260	1200	100.9	41.9	59.0											0.0922	8.04	3.34	4.70	0.00	0.00	0.00
1995	261	1015	95.4	45.0	50.4	34.8	21.3	7.7	231.9	8.0	6	470		52.3		0.0846	6.46	3.05	3.41	19.23	11.77	4.25
1995	261	1200	97.1	42.2	54.9											0.0963	0.59	0.26	0.33	0.00	0.00	0.00
1995	262	1200	93.2	41.6	51.6											0.0842	6.78	3.03	3.76	0.00	0.00	0.00
1995	263	1200	93.9	40.9	53.0											0.0842	6.83	2.98	3.86	0.00	0.00	0.00
1995	264	1000	92.1	39.5	52.6											0.0842	6.15	2.64	3.51	0.00	0.00	0.00
1995	264	1200	114.8	41.3	73.5											0.0842	0.70	0.25	0.45	0.00	0.00	0.00
1995	265	1200	91.8	37.4	54.4											0.0842	6.68	2.72	3.96	0.00	0.00	0.00
1995	266	1200	92.1	38.1	54.0											0.0842	6.70	2.78	3.93	0.00	0.00	0.00
1995	267	1200	96.7	34.0	62.7											0.0842	7.04	2.47	4.56	0.00	0.00	0.00
1995	268	1015	88.0	32.6	55.4	27.7	30.2	3.4	230	8.0	7	498		52.7		0.0833	5.87	2.18	3.70	14.11	15.39	1.73
1995	268	1200	85.5	34.0	51.5											0.0963	0.52	0.21	0.31	0.00	0.00	0.00
1995	269	1200	86.1	27.3	58.8											0.0842	6.27	1.99	4.28	0.00	0.00	0.00
1995	270	1200	82.5	25.9	56.6											0.0842	6.01	1.89	4.12	0.00	0.00	0.00
1995	271	1025	80.8	26.6	54.2											0.0846	5.51	1.82	3.70	0.00	0.00	0.00
1995	271	1200	83.6	26.9	56.7											0.0798	0.38	0.12	0.26	0.00	0.00	0.00
1995	272	1200	84.3	26.6	57.7											0.0832	6.06	1.91	4.15	0.00	0.00	0.00
1995	273	1200	84.3	25.5	58.8											0.0769	5.60	1.69	3.91	0.00	10.95	1.23

Appendix E2: Physical and chemical data collected from the forested watershed F2 for 1994 and 1995.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1994	114	1200	114.7	77.3	37.4					7.2	4	114				0.3214	3.18	2.15	1.04			
1994	116	1040	106.4	73.0	33.4					7.2	4	136				0.2631	4.69	3.22	1.47			
1994	119	1120	103.6	59.7	43.9					7.3	7	119				0.2631	7.16	4.13	3.04			
1994	120															0.2631	0.00	0.00	0.00			
1994	123	1015	122.4	83.3	39.1	59.6				7.2	9	158				0.2631	9.51	6.47	3.04			
1994	125	1110	94.2	59.7	34.5					7.5	9	150				0.2543	4.23	2.68	1.55			
1994	127	1125	84.4	59.1	25.3					7.4	10	153				0.2631	3.88	2.72	1.16			
1994	130	1200	97.8	73.2	24.6					7.7	11	187				0.1583	4.04	3.02	1.02			
1994	133	1358	91.4	65.7	25.7					7.4	13	210				0.1464	3.56	2.56	1.00			
1994	136	0815	106.0	68.7	37.3	45.1				8.0	10	218				0.1842	4.64	3.01	1.63			
1994	136	1435	152.5	63.4	89.1	37.7				7.8		237				0.5554	1.98	0.82	1.16			
1994	136	2100	385.2	72.1	313.1	42.8				7.8		340				0.4949	4.46	0.83	3.63			
1994	137	0920	132.3	71.7	60.6	45.8				7.6	8	167				0.3888	2.31	1.25	1.06			
1994	137	2020	108.9	69.9	39.0	42.5				7.5	9	166				0.3428	1.48	0.95	0.53			
1994	139	1215	95.5	55.8	39.7	33.9				7.8	9	152				0.5245	7.12	4.16	2.96			
1994	140	2050	139.5	53.7	85.8	30.9				7.9		146				0.5245	8.69	3.35	5.35			
1994	141	0945	112.4	50.2	62.2	33.5				7.8		149				0.8553	4.33	1.93	2.39			
1994	141	2115	100.1	51.9	48.2	36.4				7.8		137				0.8999	3.73	1.93	1.80			
1994	142	1700	555.0	38.6	516.4	21.8				7.7		147				1.1503	45.97	3.20	42.77			
1994	143	1410	90.9	46.7	44.2	29.9				7.6		133				0.7710	5.30	2.72	2.58			
1994	145	1010	89.0	52.1	36.9	29.8				7.8		134				0.6932	9.77	5.72	4.05			
1994	147	0922	104.8	57.8	47.0	38.2				7.6	15	138				0.6044	10.83	5.97	4.86			
1994	150	1500	87.5	62.5	25.0					7.5	16	143				0.3888	9.49	6.78	2.71			
1994	150	1600	91.5	57.2	34.3					7.6	13					0.3551	0.12	0.07	0.04			
1994	150	2000	95.8	64.7	31.1					7.7						0.3551	0.49	0.33	0.16			
1994	151	0000	101.5	64.3	37.2					7.5						0.3551	0.52	0.33	0.19			
1994	151	0400	96.5	64.7	31.8					7.7						0.3551	0.49	0.33	0.16			
1994	151	0800	100.8	62.2	38.6					7.7						0.3551	0.52	0.32	0.20			
1994	151	1200	92.9	61.8	31.1					7.7						0.3551	0.48	0.32	0.16			
1994	151	1420	91.9	61.5	30.4					7.7	16					0.3214	0.27	0.18	0.09			
1994	151	2000	96.6	68.4	28.2							152				0.2197	0.42	0.30	0.12			
1994	152	0400	98.4	65.9	32.5							154				0.2197	0.62	0.42	0.21			
1994	152	1200	106.7	72.3	34.4							157				0.2197	0.68	0.46	0.22			
1994	152	1600	107.0	71.6	35.4							155				0.2197	0.34	0.23	0.11			
1994	152	2000	113.5	72.7	40.8							153				0.2197	0.36	0.23	0.13			
1994	153	0000	123.5	79.8	43.7							153				0.2197	0.39	0.25	0.14			
1994	153	0400	147.1	88.8	58.3							153				0.2197	0.47	0.28	0.18			

Appendix E2

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1994	153	0800	135.3	80.2	55.1							147				0.2197	0.43	0.25	0.17			
1994	153	1100	124.9	78.0	46.9							141				0.4394	0.59	0.37	0.22			
1994	153	1200	118.3	65.5	52.8							143				0.4024	0.17	0.09	0.08			
1994	153	1600	109.4	66.9	42.5							146				0.4024	0.63	0.39	0.25			
1994	153	2000	104.8	65.9	38.9							143				0.3653	0.55	0.35	0.20			
1994	154	0000	107.8	69.7	38.1							144				0.3541	0.55	0.36	0.19			
1994	154	0400	109.5	68.7	40.8							146				0.3541	0.56	0.35	0.21			
1994	154	0800	107.7	68.7	39.0							147				0.3541	0.55	0.35	0.20			
1994	154	1200	111.8	75.1	36.7							148				0.3428	0.55	0.37	0.18			
1994	154	1600	112.8	75.8	37.0							145				0.3321	0.54	0.36	0.18			
1994	154	2000	111.7	78.7	33.0							148				0.3321	0.53	0.38	0.16			
1994	155	0000	126.0	87.7	38.3							147				0.3321	0.60	0.42	0.18			
1994	155	0400	114.6	76.5	38.1							146				0.3321	0.55	0.37	0.18			
1994	155	0800	126.8	79.4	47.4											0.3214	0.59	0.37	0.22			
1994	155	1600	113.1	75.2	37.9							153				0.3214	1.05	0.70	0.35			
1994	156	0000	114.9	85.6	29.3							159				0.3280	1.09	0.81	0.28			
1994	156	0800	125.6	88.4	37.2							155				0.3280	1.19	0.84	0.35			
1994	156	1600	119.5	82.0	37.5							158				0.3280	1.13	0.77	0.35			
1994	157	0000	128.5	92.7	35.8							155				0.3280	1.21	0.88	0.34			
1994	157	0800	134.2	92.3	41.9							152				0.3280	1.27	0.87	0.40			
1994	157	1200	132.1	89.8	42.3					7.8		152				0.3319	0.63	0.43	0.20			
1994	159	0940	446.3	85.5	360.8					6.4		116				1.1503	84.09	16.11	67.98			
1994	159	1200	336.6	79.2	257.4							122				0.7313	2.22	0.52	1.69			
1994	159	1530	252.9	91.6	161.3							124				0.7313	2.33	0.84	1.49			
1994	159	1600	227.7	92.3	135.4							124				0.7313	0.30	0.12	0.18			
1994	159	2000	234.5	89.0	145.5							125				0.5264	1.78	0.67	1.10			
1994	160	0000	396.3	89.0	307.3							130				0.5264	3.00	0.67	2.33			
1994	160	0400	218.2	93.4	124.8							153				0.5264	1.65	0.71	0.95			
1994	160	0800	168.6	98.4	70.2							158				0.5264	1.28	0.75	0.53			
1994	160	1200	167.2	107.1	60.1							159				0.5264	1.27	0.81	0.46			
1994	160	1600	167.9	100.6	67.3							158				0.5264	1.27	0.76	0.51			
1994	160	3000	367.7	124.1	243.6							156				0.5264	2.79	0.94	1.85			
1994	161	0000	257.7	110.0	147.7							157				0.5264	1.95	0.83	1.12			
1994	161	0400	357.6	98.8	258.8							162				0.5264	2.71	0.75	1.96			
1994	161	0800	256.2	95.2	161.0						14	165				0.3214	1.19	0.44	0.75			
1994	162	0400	121.6	95.1	26.5							153				0.2835	2.48	1.94	0.54			
1994	162	2000	126.3	91.4	34.9							165				0.2835	2.06	1.49	0.57			

Appendix E2

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1994	163	1200	135.4	94.0	41.4							163				0.2456	1.92	1.33	0.59			
1994	163	1600	132.6	90.5	42.1							189				0.2544	0.49	0.33	0.15			
1994	163	2000	125.7	96.0	29.7											0.2544	0.46	0.35	0.11			
1994	164	0000	126.0	97.1	28.9							185				0.2544	0.46	0.36	0.11			
1994	164	0400	140.3	102.6	37.7							182				0.2544	0.51	0.38	0.14			
1994	164	0800	159.0	97.8	61.2							165				0.2631	0.60	0.37	0.23			
1994	164	1200	164.9	104.0	60.9							175				0.3142	0.75	0.47	0.28			
1994	164	1600	237.3	90.7	146.6							186				0.3653	1.25	0.48	0.77			
1994	164	2000	154.6	101.3	53.3							180				0.5109	1.14	0.75	0.39			
1994	165	0000	151.7	106.1	45.6							176				0.5109	1.12	0.78	0.34			
1994	165	0400	138.1	92.5	45.6							181				0.5109	1.02	0.68	0.34			
1994	165	0800	139.9	102.1	37.8							178				0.5109	1.03	0.75	0.28			
1994	165	1200	214.5	107.9	106.6							160				0.5109	1.58	0.79	0.78			
1994	165	1600	169.9	93.1	76.8						11	147				0.6565	1.61	0.88	0.73			
1994	165	2000	150.6	86.9	63.7							141				0.7782	1.69	0.97	0.71			
1994	166	0000	162.6	83.2	79.4							138				0.7782	1.82	0.93	0.89			
1994	166	0400	162.2	80.7	81.5							136				0.7782	1.82	0.90	0.91			
1994	166	0800	156.0	77.1	78.9							131				0.7782	1.75	0.86	0.88			
1994	166	1200	154.6	76.0	78.6							133				0.7782	1.73	0.85	0.88			
1994	166	1600	140.7	76.0	64.7							131				0.7782	1.58	0.85	0.73			
1994	166	2000	125.8	80.0	45.8	31.4										0.8999	1.63	1.04	0.59			
1994	167	0000	121.1	73.1	48.0							129				0.8355	1.46	0.88	0.58			
1994	167	0400	123.3	71.2	52.1							141				0.8355	1.48	0.86	0.63			
1994	167	0800	123.6	70.1	53.5							129				0.8355	1.49	0.84	0.64			
1994	167	1200	117.5	69.4	48.1							128				0.8355	1.41	0.83	0.58			
1994	167	1600	110.2	65.6	44.5							124				0.7710	1.22	0.73	0.49			
1994	168	0000	109.2	59.4	49.8							126				0.6794	2.14	1.16	0.97			
1994	168	0800	107.4	63.1	44.3							126				0.6794	2.10	1.23	0.87			
1994	168	1600	102.9	59.7	43.2							124				0.6794	2.01	1.17	0.85			
1994	169	0000	102.9	56.8	46.1							124				0.6794	2.01	1.11	0.90			
1994	169	0800	101.8	56.8	45.0						8	124				0.5877	1.72	0.96	0.76			
1994	169	1600	120.8	53.8	67.0							124				0.5716	1.99	0.89	1.10			
1994	170	0000	151.6	55.3	96.3							126				0.5716	2.50	0.91	1.59			
1994	170	0800	107.7	56.0	51.7							127				0.5716	1.77	0.92	0.85			
1994	170	1600	103.6	57.1	46.5							126				0.5716	1.71	0.94	0.77			
1994	171	0000	98.1	56.8	41.3							124				0.5716	1.61	0.94	0.68			
1994	171	800	105.1	60.5	44.6							130				0.5716	1.73	1.00	0.73			

Appendix E2

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1994	171	1600	101.4	59.7	41.7						16	126				0.5554	1.62	0.95	0.67			
1994	172	0	104.4	60.9	43.5							126				0.5400	1.62	0.95	0.68			
1994	172	800	107.0	64.2	42.8							128				0.5400	1.66	1.00	0.67			
1994	172	1600	105.1	59.9	45.2						19					0.5245	1.59	0.90	0.68			
1994	178	1045	165.6	126.3	39.3											0.2290	18.91	14.42	4.49			
1994	178	2300	150.1	107.5	42.6											0.2650	1.79	1.28	0.51			
1994	179	1100	166.6	114.3	52.3											0.2650	1.91	1.31	0.60			
1994	179	1600	197.7	121.5	76.2											0.3332	1.11	0.68	0.43			
1994	179	2000	194.5	112.9	81.6											0.3332	0.93	0.54	0.39			
1994	180	0000	197.7	127.2	70.5											0.3332	0.95	0.61	0.34			
1994	180	0400	184.8	126.1	58.7											0.3332	0.89	0.61	0.28			
1994	180	0800	195.2	130.4	64.8						11					0.3332	0.94	0.63	0.31			
1994	180	2000	167.5	118.4	49.1											0.3332	2.45	1.73	0.72			
1994	181	0800	168.9	125.0	43.9											0.3332	2.43	1.80	0.63			
1994	181	2000	163.1	126.1	37.0											0.3332	2.35	1.82	0.53			
1994	182	1200	168.9	134.4	34.5						16					0.3332	3.24	2.58	0.66			
1994	182	2000	150.7	109.6	41.1						13	149				0.4444	1.73	1.26	0.47			
1994	183	0000	150.0	117.4	32.5							161				0.4444	0.96	0.75	0.21			
1994	183	0400	260.4	112.4	148.0							157				0.4444	1.67	0.72	0.95			
1994	183	0800	225.4	121.7	103.7							158				0.4444	1.44	0.78	0.66			
1994	183	1200	211.8	121.7	90.1							151				0.4444	1.36	0.78	0.58			
1994	183	1600	204.3	120.6	83.7						16	154				0.9868	2.17	1.28	0.89			
1994	183	2000	207.9	117.4	90.5							151				0.9868	2.95	1.67	1.29			
1994	184	0000	195.0	111.7	83.3							148				0.9868	2.77	1.59	1.18			
1994	184	0400	183.9	106.0	77.9							145				0.9868	2.61	1.51	1.11			
1994	184	0800	193.9	107.8	86.1							145				0.9868	2.76	1.53	1.22			
1994	184	1200	142.6	90.7	51.9							169				1.8043	3.06	1.95	1.11			
1994	184	1600	141.2	87.2	54.0							153				1.8043	3.67	2.27	1.40			
1994	184	2000	134.1	77.6	56.5							161				2.2228	4.29	2.48	1.81			
1994	185	0000	208.0	79.0	129.0							136				2.3158	6.94	2.63	4.30			
1994	185	0400	179.9	76.9	103.0							129				2.3158	6.00	2.56	3.43			
1994	185	0800	236.0	78.0	158.0							131				2.3158	7.87	2.60	5.27			
1994	185	1200	161.8	84.7	77.1							130				2.3158	5.56	2.91	2.65			
1994	185	1600	160.0	81.5	78.5							133				2.3158	5.34	2.72	2.62			
1994	185	2000	154.7	83.3	71.4							124				2.3158	5.16	2.78	2.38			
1994	186	0000	163.1	81.4	81.7							123				2.3158	5.44	2.72	2.72			
1994	186	0400	148.9	84.0	64.9							123				2.3158	4.96	2.80	2.16			

Appendix E2

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1994	186	0800	147.0	89.8	57.2							123				2.3158	4.90	2.99	1.91			
1994	186	1200	145.0	90.1	54.9											1.8696	4.36	2.71	1.65			
1994	186	1600	140.3	84.4	55.9											1.8696	3.78	2.27	1.51			
1994	186	2000	131.6	91.9	39.7											1.8696	3.54	2.47	1.07			
1994	187	0000	141.4	92.7	48.7											1.8696	3.81	2.49	1.31			
1994	187	0400	130.6	81.1	49.5											1.8696	3.51	2.18	1.33			
1994	187	0800	135.2	93.0	42.2											1.8696	3.64	2.50	1.14			
1994	187	1200	134.2	80.7	53.5											1.8696	3.61	2.17	1.44			
1994	187	1600	132.0	81.8	50.2											1.8696	3.55	2.20	1.35			
1994	187	2000	124.1	79.7	44.4											1.8696	3.34	2.14	1.20			
1994	188	0000	118.6	76.8	41.8											1.8696	3.19	2.07	1.13			
1994	188	0400	120.1	78.9	41.2											1.8696	3.23	2.12	1.11			
1994	188	0800	121.2	78.2	43.0											1.8696	3.26	2.11	1.16			
1994	188	1200	120.1	70.5	49.6							131				1.2555	2.45	1.44	1.01			
1994	188	1600	112.9	69.8	43.1							123				1.2555	2.04	1.26	0.78			
1994	188	2000	116.1	69.1	47.0							130				1.2555	2.10	1.25	0.85			
1994	189	0000	115.8	70.2	45.6							121				1.2555	2.09	1.27	0.82			
1994	189	0400	116.1	73.1	43.0							146				1.2555	2.10	1.32	0.78			
1994	189	0800	110.7	68.7	42.0							121				1.2555	2.00	1.24	0.76			
1994	189	1200	112.5	73.1	39.4							121				1.2555	2.03	1.32	0.71			
1994	189	1600	112.5	75.2	37.3							118				1.2555	2.03	1.36	0.67			
1994	189	2000	158.9	81.0	77.9							120				1.2555	2.87	1.46	1.41			
1994	190	0000	131.7	81.8	49.9							131				1.2555	2.38	1.48	0.90			
1994	190	0400	127.4	82.8	44.6							135				1.2555	2.30	1.50	0.81			
1994	190	0800	129.9	88.3	41.6							126				1.2555	2.35	1.60	0.75			
1994	190	2000	130.7	81.7	49.0							136				0.8828	5.09	3.18	1.91			
1994	192	2000	121.9	80.9	41.0					7.5	15	135				0.7512	16.16	10.73	5.44			
1994	193	0800	130.9	81.6	49.3							131				0.7512	4.25	2.65	1.60			
1994	193	2000	737.4	72.7	664.7							125				0.7512	23.93	2.36	21.57			
1994	194	1015	162.7	83.7	79.0							143				0.7313	6.00	3.08	2.91			
1994	195	0000	144.3	73.5	70.8							124				1.5701	11.42	5.82	5.60			
1994	196	1200	142.3	73.0	69.3							117				1.5701	28.96	14.85	14.10			
1994	197	0000	130.5	74.8	55.7							116				1.5701	8.85	5.07	3.78			
1994	197	1200	149.8	74.4	75.4							120				1.5701	10.16	5.05	5.11			
1994	198	0000	132.3	74.8	57.5											1.5701	8.97	5.07	3.90			
1994	198	1200	150.9	75.5	75.4											1.5701	10.24	5.12	5.11			
1994	199	0000	195.5	71.2	124.3											1.5701	13.26	4.83	8.43			

Appendix E2

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1994	199	0800	296.6	62.7	233.9											1.5701	13.41	2.84	10.58			
1994	199	2000	298.5	58.7	239.7						19	114				1.9626	26.50	5.21	21.29			
1994	200	0800	276.3	50.3	226.0							124				1.9626	23.43	4.26	19.16			
1994	200	2000	197.2	51.0	146.2							117				1.9626	16.72	4.32	12.40			
1994	201	0800	182.4	63.3	119.1						18	121				1.9626	15.46	5.37	10.10			
1994	202	0000	205.6	62.9	142.7											1.1437	13.96	4.27	9.69			
1994	202	1200	163.8	68.9	94.9											1.1437	8.09	3.40	4.69			
1994	203	0000	179.6	78.0	101.6											1.1437	8.87	3.85	5.02			
1994	203	0800	184.2	80.5	103.7						18					0.6052	3.21	1.40	1.81			
1994	203	2000	167.2	74.5	92.7							134				0.6052	4.52	2.01	2.51			
1994	204	0800	174.8	94.7	80.1							120				0.6052	4.57	2.48	2.09			
1994	204	2000	163.9	91.8	72.1							122				0.6052	4.29	2.40	1.89			
1994	205	0800	178.4	98.7	79.7							125				0.6052	4.66	2.58	2.08			
1994	205	2000	185.9	113.4	72.5							125				0.6052	4.86	2.96	1.90			
1994	206	0800	188.8	112.4	76.4						20	130				0.6052	4.94	2.94	2.00			
1994	206	2000	161.4	101.2	60.2							145				0.3752	2.67	1.68	1.00			
1994	207	0800	183.4	107.0	76.4							141				0.3752	2.97	1.73	1.24			
1994	207	2000	187.8	124.3	63.5							147				0.3752	3.04	2.01	1.03			
1994	208	0800	200.4	120.7	79.7							154				0.3752	3.25	1.96	1.29			
1994	208	2000	202.2	140.1	62.1							162				0.3752	3.28	2.27	1.01			
1994	209	0800	218.0	152.0	66.0						20	164				0.3752	3.53	2.46	1.07			
1994	210	0000	200.2	153.8	46.4							152				0.2800	3.30	2.53	0.76			
1994	210	1200	230.8	158.2	72.6							160				0.2800	2.79	1.91	0.88			
1994	211	0000	203.4	154.2	49.2							169				0.2800	2.46	1.87	0.60			
1994	211	1200	236.7	157.1	79.6							171				0.2800	2.86	1.90	0.96			
1994	212	0000	228.6	158.2	70.4							168				0.2800	2.77	1.91	0.85			
1994	212	1200	246.1	153.1	93.0							117				0.2800	2.98	1.85	1.12			
1994	213	1200	224.9	155.0	69.9											0.2033	3.95	2.72	1.23			
1994	214	1200	227.5	155.0	72.5											0.2033	4.00	2.72	1.27			
1994	215	1200	217.0	143.4	73.6											0.2033	3.81	2.52	1.29			
1994	216	1105			0.0											0.1775	0.00	0.00	0.00			
1994	216	1200	324.2	178.6	145.6											0.1649	4.96	2.73	2.23			
1994	217	1200	376.0	237.5	138.5							235				0.1649	5.36	3.38	1.97			
1994	218	1200	291.6	201.0	90.6							279				0.1649	4.15	2.86	1.29			
1994	219	1200	257.3	183.4	73.9							275				0.1649	3.67	2.61	1.05			
1994	220	1200	256.2	198.5	57.7					7.4	14	242				0.1649	3.65	2.83	0.82			
1994	221	1200	241.4	186.2	55.2							297				0.1522	3.17	2.45	0.73			

Appendix E2

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1994	222	1200	234.5	157.7	76.8							260				0.1522	3.08	2.07	1.01			
1994	223	1200	234.9	172.5	62.4							242				0.1522	3.09	2.27	0.82			
1994	224	1200	212.2	151.6	60.6							275				0.1522	2.79	1.99	0.80			
1994	225	1200	214.0	155.6	58.4							273				0.1522	2.81	2.05	0.77			
1994	226	1200	233.8	144.8	89.0							252				0.1522	3.07	1.90	1.17			
1994	227	1200	279.2	157.4	121.8					7.7	18	218				0.1522	3.67	2.07	1.60			
1994	228	1200	220.1	166.2	53.9							241				0.2198	4.02	3.04	0.98			
1994	229	1200	214.3	144.8	69.5							356				0.2198	4.07	2.75	1.32			
1994	230	1200	203.5	138.7	64.8							343				0.2198	3.86	2.63	1.23			
1994	231	1200	223.7	152.8	70.9							378				0.2198	4.25	2.90	1.35			
1994	232	1200	211.8	139.0	72.8							339				0.2198	4.02	2.64	1.38			
1994	233	0950	227.7	127.1	100.6					7.9	16	340				0.1352	2.44	1.36	1.08			
1994	233	1200	215.4	141.2	74.2							355				0.1408	0.22	0.14	0.08			
1994	234	1200	275.1	163.7	111.4							270				0.1408	3.35	1.99	1.36			
1994	235	1200	224.8	161.8	63.0							239				0.1408	2.73	1.97	0.77			
1994	236	1200	228.1	161.5	66.6							252				0.1408	2.77	1.96	0.81			
1994	237	1200	223.7	121.3	102.4							329				0.1408	2.72	1.48	1.25			
1994	238	1200	202.4	139.0	63.4							360				0.1408	2.46	1.69	0.77			
1994	239	1200	202.0	140.1	61.9							378				0.1464	2.56	1.77	0.78			
1994	240	1200	195.4	134.0	61.4							353				0.1464	2.47	1.69	0.78			
1994	241	1200	188.0	125.9	62.1							365				0.1464	2.38	1.59	0.79			
1994	242	1200	169.8	110.4	59.4							365				0.1464	2.15	1.40	0.75			
1994	243	1200	187.0	111.5	75.5							376				0.1464	2.37	1.41	0.95			
1994	244	1200	184.5	113.6	70.9							376				0.1464	2.33	1.44	0.90			
1994	245	1200	181.4	103.0	78.4							388				0.1464	2.29	1.30	0.99			
1994	246	1020	186.3	97.1	89.2						10	399				0.1464	2.21	1.15	1.06			
1994	246	1200	180.7	103.4	77.3							388				0.1653	0.16	0.09	0.07			
1994	247	1200	206.7	91.8	114.9							366				0.1653	2.46	1.09	1.37			
1994	247	0902	240.0	100.2	139.8							354				0.1842	0.16	0.07	0.09			
1994	247	1200	205.6	106.9	98.7							312				0.3825	0.85	0.44	0.41			
1994	247	1600	193.7	110.1	83.6							307				0.1983	0.55	0.31	0.24			
1994	248	1200	172.2	99.5	72.7							301				0.1724	2.14	1.24	0.90			
1994	249	1200	169.1	100.6	68.5							330				0.1724	2.52	1.50	1.02			
1994	250	1200	159.9	96.7	63.2							335				0.1724	2.38	1.44	0.94			
1994	251	1200	166.6	83.7	82.9							348				0.1724	2.48	1.25	1.23			
1994	252	1200	162.0	90.4	71.6							354				0.1724	2.41	1.35	1.07			
1994	253	1200	165.6	88.6	77.0							354				0.1724	2.47	1.32	1.15			

Appendix E2

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1994	254	1000	170.1	94.6	75.5						10	389				0.1464	1.97	1.10	0.88			
1994	254	1200	167.4	97.8	69.6											0.1524	0.18	0.11	0.08			
1994	255	1200	153.3	82.6	70.7											0.1524	2.02	1.09	0.93			
1994	256	1200	142.1	77.6	64.5											0.1524	1.87	1.02	0.85			
1994	257	1200	138.5	75.1	63.5											0.1524	1.82	0.99	0.84			
1994	258	1200	139.2	67.1	72.1											0.1524	1.83	0.88	0.95			
1994	259	1200	134.9	68.2	66.7											0.1524	1.78	0.90	0.88			
1994	260	1200	135.6	72.9	62.7											0.1524	1.79	0.96	0.83			
1994	261	1130	128.4	76.5	51.9					7.9						0.1583	1.72	1.02	0.69			
1994	261	1200	141.4	90.6	50.8											0.1553	0.04	0.03	0.01			
1994	261	1600	133.1	76.5	56.6											0.1553	0.30	0.17	0.13			
1994	261	2000	136.3	83.0	53.3											0.1553	0.30	0.19	0.12			
1994	262	0000	127.0	73.3	53.7											0.1553	0.28	0.16	0.12			
1994	262	0400	134.2	85.5	48.7											0.1553	0.30	0.19	0.11			
1994	262	0800	125.5	79.4	46.1											0.1553	0.28	0.18	0.10			
1994	263	1200	121.3	61.7	59.6											0.1553	1.90	0.97	0.93			
1994	264	1200	128.1	67.1	61.0											0.1553	1.72	0.90	0.82			
1994	265	1200	124.9	63.1	61.8											0.1553	1.68	0.85	0.83			
1994	266	1040	139.2	84.3	54.9					7.8	8					0.1522	1.72	1.04	0.68			
1994	266	1200	118.4	55.2	63.2											0.1522	0.10	0.05	0.05			
1994	267	1200	110.2	50.6	59.6											0.1522	1.45	0.67	0.78			
1994	268	1200	108.0	49.5	58.5											0.1522	1.42	0.65	0.77			
1994	269	1200	183.0	85.0	98.0											0.1522	2.41	1.12	1.29			
1994	270	1200	118.4	64.2	54.2											0.1522	1.56	0.84	0.71			
1994	271	1200	107.6	48.8	58.8											0.1522	1.41	0.64	0.77			
1994	272	1200	104.8	45.5	59.3											0.1522	1.38	0.60	0.78			
1994	273	1138	110.2	50.2	60.0					7.9		86				0.1522	1.42	0.65	0.77			
1994	273	1200	111.2	52.4	58.8											0.1553	0.03	0.01	0.02			
1994	274	1200	103.0	34.4	68.6											0.1553	1.38	0.46	0.92			
1994	275	1200	118.1	46.2	71.9											0.1553	1.58	0.62	0.96			
1994	276	1200	127.4	56.4	71.0											0.1553	1.71	0.76	0.95			
1994	277	1200	141.8	75.7	66.1											0.1553	1.90	1.02	0.89			
1994	278	1200	124.9	64.2	60.7											0.1553	1.68	0.86	0.81			
1994	279	1200	120.6	60.6	60.0											0.1553	1.62	0.81	0.81			
1994	280	1200	123.8	71.0	52.8											0.1553	1.66	0.95	0.71			
1994	280	1350	116.3	46.2	70.1					8.0	7	325				0.1583	0.13	0.05	0.08			
1994	281	1200	111.4	47.7	63.7											0.1364	1.20	0.52	0.69			

Appendix E2

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1994	282	1200	120.7	56.9	63.8											0.1364	1.42	0.67	0.75			
1994	283	1200	325.9	89.0	236.9											0.1364	3.84	1.05	2.79			
1994	284	1200	144.2	80.4	63.8											0.1364	1.70	0.95	0.75			
1994	285	1200	127.8	57.6	70.2											0.1364	1.51	0.68	0.83			
1994	286	1200	122.1	50.5	71.6											0.1364	1.44	0.60	0.84			
1994	287	1200	122.5	51.9	70.6											0.1364	1.44	0.61	0.83			
1994	287	1526	114.3	45.9	68.4						4					0.1148	0.17	0.07	0.10			
1994	288	1200	117.1	38.4	78.7											0.1198	1.04	0.34	0.70			
1994	289	1200	112.2	37.3	74.9											0.1198	1.16	0.39	0.78			
1994	290	1200	114.3	34.1	80.2											0.1198	1.18	0.35	0.83			
1994	291	1200	117.1	32.3	84.8											0.1198	1.21	0.33	0.88			
1994	292	1200	116.4	32.0	84.4											0.1198	1.20	0.33	0.87			
1994	293	1200	117.1	29.5	87.7											0.1198	1.21	0.31	0.91			
1994	294	1200	113.9	28.8	85.1											0.1198	1.18	0.30	0.88			
1994	295	1200	126.8	40.2	86.6											0.1198	1.31	0.42	0.90			
1994	295	1430	104.0	38.8	65.2							595				0.1247	0.12	0.04	0.07			
1994	296	1200	92.6	52.8	39.8							144				0.2450	1.76	1.00	0.76			
1994	297	1200	164.3	93.7	70.6											0.2450	3.48	1.98	1.50			
1994	298	1200	102.1	58.2	43.9											0.2450	2.16	1.23	0.93			
1994	299	1200	120.1	68.5	51.6											0.2450	2.54	1.45	1.09			
1994	300	1200	136.0	77.5	58.5											0.2450	2.88	1.64	1.24			
1994	303	1445	229.3	91.5	137.8											0.3653	22.46	8.96	13.50			
1994	312	1240	141.7	54.0	87.7					7.4		440				0.2290	25.00	9.53	15.47			
1994	319	1240	174.9	86.2	88.7					7.4		485				0.2290	24.22	11.94	12.29			
1995	75	1500	153.8	63.5	90.3											0.0202	3.04	1.25	1.78	0.00	0.00	0.00
1995	76	1030	151.6	45.8	105.8											0.0227	0.24	0.07	0.17	0.00	0.00	0.00
1995	76	1630	187.0	85.5	101.5					7.8		557				0.0260	0.11	0.05	0.06	0.00	0.00	0.00
1995	77	1230	217.7	76.5	141.2		164.2	53.9								0.0293	0.46	0.16	0.30	0.00	3.95	1.30
1995	77	1800	274.1	146.9	127.2		176.7	73.5								0.0322	0.17	0.09	0.08	0.00	0.11	0.05
1995	78	1245	321.0	219.5	101.5		269.6	217.4								0.0351	0.76	0.52	0.24	0.00	0.64	0.52
1995	78	1800	320.0	232.5	87.5		237.4	193.0								0.0409	0.25	0.18	0.07	0.00	0.18	0.15
1995	79	1440	313.1	241.2	71.9		181.4	215.4						43.6	2.8	0.0467	1.09	0.84	0.25	0.00	0.63	0.75
1995	80	1402	365.5	267.9	97.6		122.0	340.6								0.0591	1.82	1.33	0.49	0.00	0.61	1.70
1995	80	1820	439.5	345.2	94.3		126.2	339.7								0.0583	0.39	0.31	0.08	0.00	0.11	0.30
1995	81	1100	447.1	359.7	87.4		114.3	270.8								0.0574	1.54	1.24	0.30	0.00	0.39	0.93
1995	81	1545	441.1	357.2	83.9		109.9	279.0								0.0450	0.34	0.28	0.06	0.00	0.08	0.21

Appendix E2

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1995	82	1800	339.6	282.9	56.7											0.0326	1.05	0.87	0.17	0.00	0.00	0.00
1995	83	1345	272.9	218.9	54.0	177.2										0.0268	0.52	0.42	0.10	8.22	0.00	0.00
1995	84	1400	236.2	190.3	45.9	156.0										0.0252	0.52	0.42	0.10	0.34	0.00	0.00
1995	85	1400	210.1	159.3	50.8		261.4	154.6						41.5	1.9	0.0235	0.43	0.32	0.10	0.00	2.41	1.43
1995	86	1440	181.2	140.3	40.9											0.0219	0.35	0.27	0.08	0.00	0.00	0.00
1995	87	1520	157.5	119.1	38.4											0.0219	0.31	0.23	0.07	0.00	0.00	0.00
1995	88	1550	156.8	122.6	34.2											0.0252	0.35	0.27	0.08	0.00	0.00	0.00
1995	89	1435	161.8	121.9	39.9											0.0302	0.40	0.30	0.10	0.00	0.00	0.00
1995	90	1605	155.4	108.8	46.6	83.7										0.0384	0.55	0.38	0.16	1.18	0.00	0.00
1995	91	1300	193.0	143.9	49.1	117.2										0.0368	0.53	0.40	0.14	0.32	0.00	0.00
1995	92	1315	170.1	125.2	44.9		57.3	88.6		7.8		230		23.9	1.4	0.0360	0.53	0.39	0.14	0.00	1.03	1.60
1995	93	1130	139.2	102.7	36.5											0.0351	0.39	0.29	0.10	0.00	0.00	0.00
1995	94	1445	121.3	89.4	31.9											0.0210	0.25	0.18	0.07	0.00	0.00	0.00
1995	95	1435	112.3	84.7	27.6											0.0202	0.19	0.15	0.05	0.00	0.00	0.00
1995	96	1500	111.5	80.0	31.5											0.0210	0.21	0.15	0.06	0.00	0.00	0.00
1995	97	1410	108.3	84.2	24.1											0.0210	0.19	0.15	0.04	0.00	0.00	0.00
1995	98															0.0227	0.00	0.00	0.00	0.00	0.00	0.00
1995	99															0.0243	0.00	0.00	0.00	0.00	0.00	0.00
1995	100	1435	122.1	92.0	30.1	69.1			103.8	7.0		243				0.0368	0.62	0.47	0.15	1.48	0.00	0.00
1995	101	1505	146.1	118.2	27.9		43.6	72.4								0.0393	0.51	0.41	0.10	0.00	0.95	1.57
1995	102	1330	144.8	108.3	36.5											0.0426	0.50	0.37	0.13	0.00	0.00	0.00
1995	103	1400	116.1	88.1	28.0											0.0442	0.45	0.34	0.11	0.00	0.00	0.00
1995	104															0.0451	0.00	0.00	0.00	0.00	0.00	0.00
1995	105	1416	124.2	86.6	37.6											0.0401	0.69	0.48	0.21	0.00	0.00	0.00
1995	106	1410	113.7	72.3	41.4		29.4	27.2				205		21.4	0.9	0.0351	0.34	0.22	0.13	0.00	0.51	0.48
1995	107	1550	117.9	59.2	58.7	38.9			76.2	7.0						0.0368	0.40	0.20	0.20	0.95	0.00	0.00
1995	108	1415	115.4	59.3	56.1											0.0393	0.37	0.19	0.18	0.00	0.00	0.00
1995	109	1505	109.0	65.8	43.2											0.0368	0.36	0.22	0.14	0.00	0.00	0.00
1995	110	1515	102.0	62.3	39.7											0.0368	0.33	0.20	0.13	0.00	0.00	0.00
1995	111	1410	107.6	61.9	45.7											0.0368	0.33	0.19	0.14	0.00	0.00	0.00
1995	112															0.0376	0.00	0.00	0.00	0.00	0.00	0.00
1995	113	1400	110.4	64.7	45.7	44.1	x	x					11.2	22.6	1.0	0.0376	0.57	0.33	0.24	0.82	0.00	0.00
1995	114	1410	99.7	60.7	39.0	42.3			99.3	7.9		272				0.0368	0.16	0.10	0.06	0.07	0.00	0.00
1995	115	1340	115.1	68.5	46.6											0.0425	0.41	0.25	0.17	0.00	0.00	0.00
1995	116	1415	101.5	60.3	41.2											0.0425	0.38	0.23	0.15	0.00	0.00	0.00
1995	117	1420	96.5	61.4	35.1		78.8	94.5								0.0425	0.36	0.23	0.13	0.00	2.73	3.27
1995	118	1345	95.4	58.9	36.5											0.0425	0.34	0.21	0.13	0.00	0.00	0.00

Appendix E2

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1995	119															0.0425	0.00	0.00	0.00	0.00	0.00	0.00
1995	120															0.0425	0.00	0.00	0.00	0.00	0.00	0.00
1995	121	1030	92.6	45.3	47.3	35.7	69.9	67.2	139.7	7.8		367				0.0425	0.97	0.48	0.50	0.90	0.99	0.95
1995	122	1400	88.3	52.1	36.2								27.9	40.2	0.7	0.0513	0.45	0.26	0.18	0.00	0.00	0.00
1995	123	1200	89.7	49.9	39.8											0.0425	0.30	0.17	0.13	0.00	0.00	0.00
1995	124															0.0425	0.00	0.00	0.00	0.00	0.00	0.00
1995	125	1215	95.9	41.9	54.0											0.0425	0.71	0.31	0.40	0.00	0.00	0.00
1995	126	1145	78.8	41.6	37.2											0.0425	0.28	0.15	0.13	0.00	0.00	0.00
1995	127	1200	92.0	41.2	50.8											0.0469	0.38	0.17	0.21	0.00	0.00	0.00
1995	127	1455	82.7	44.4	38.3											0.0513	0.04	0.02	0.02	0.00	0.00	0.00
1995	128	1200	96.2	41.6	54.6	26.3										0.0425	0.31	0.13	0.18	0.72	0.00	0.00
1995	128	1242	87.0	41.6	45.4	29.2			154.1	7.7						0.0425	0.01	0.00	0.00	0.00	0.00	0.00
1995	129	1200	97.3	45.8	51.5											0.0425	0.35	0.16	0.18	0.00	0.00	0.00
1995	129	1225	85.6	46.9	38.7		69.6	43.6					28.0	42.1	0.9	0.0425	0.01	0.00	0.00	0.00	2.16	1.35
1995	130	1105	84.9	49.2	35.7											0.0425	0.29	0.17	0.12	0.00	0.00	0.00
1995	130	1200	109.8	42.1	67.7											0.0388	0.01	0.01	0.01	0.00	0.00	0.00
1995	131	1200	94.5	42.8	51.7											0.0388	0.32	0.14	0.17	0.00	0.00	0.00
1995	131	1650	84.9	56.7	28.2											0.0350	0.05	0.03	0.02	0.00	0.00	0.00
1995	132	1200	92.7	39.6	53.1											0.0350	0.22	0.10	0.13	0.00	0.00	0.00
1995	132	1400	82.8	45.0	37.8											0.0350	0.02	0.01	0.01	0.00	0.00	0.00
1995	133	1200	77.8	41.1	36.7											0.0350	0.22	0.11	0.10	0.00	0.00	0.00
1995	133	1400	83.5	48.2	35.3											0.0350	0.02	0.01	0.01	0.00	0.00	0.00
1995	134	1200	93.6	42.9	50.7											0.0350	0.26	0.12	0.14	0.00	0.00	0.00
1995	135	0930	78.3	47.9	30.4	32.8			162.8	8.1		378				0.0350	0.21	0.13	0.08	0.73	0.00	0.00
1995	135	1200	80.1	41.4	38.7											0.0317	0.02	0.01	0.01	0.00	0.00	0.00
1995	136	1200	83.6	41.4	42.2											0.0317	0.23	0.11	0.12	0.00	0.00	0.00
1995	136	1400	73.3	46.8	26.5		26.3	31.4					29.7	47.3	0.9	0.0317	0.02	0.01	0.01	0.00	0.58	0.69
1995	137	0000	74.3	40.0	34.3											0.0317	0.08	0.05	0.04	0.00	0.00	0.00
1995	137	1400	73.3	45.7	27.6											0.0317	0.12	0.07	0.04	0.00	0.00	0.00
1995	138	1200	77.2	38.9	38.3											0.0302	0.18	0.09	0.09	0.00	0.00	0.00
1995	139	1200	73.6	41.1	32.5											0.0302	0.19	0.11	0.08	0.00	0.00	0.00
1995	139	1347	71.5	55.0	16.5											0.0287	0.01	0.01	0.00	0.00	0.00	0.00
1995	140	1200	81.5	47.5	34.0											0.0287	0.19	0.11	0.08	0.00	0.00	0.00
1995	140	1337	75.0	47.2	27.8		41.3	24.4								0.0287	0.01	0.01	0.00	0.00	0.43	0.25
1995	141	1200	82.6	40.0	42.6											0.0287	0.19	0.09	0.10	0.00	0.00	0.00
1995	141	1500	84.7	51.4	33.3											0.0287	0.03	0.02	0.01	0.00	0.00	0.00
1995	142	1200	76.2	36.5	39.7							397				0.0287	0.17	0.08	0.09	0.00	0.00	0.00

Appendix E2

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1995	142	1400	71.0	36.9	34.2	25.6			171.0	8.0	12	378				0.0287	0.01	0.01	0.01	0.48	0.00	0.00
1995	143	1200	84.0	47.2	36.8											0.0287	0.19	0.11	0.08	0.00	0.00	0.00
1995	143	1400	84.4	47.6	36.8		13.8	15.1					26.8	46.4	1.0	0.0287	0.02	0.01	0.01	0.00	0.10	0.11
1995	144	1200	80.3	40.9	39.4											0.0287	0.18	0.09	0.09	0.00	0.00	0.00
1995	144	1245	72.9	45.4	27.5											0.0287	0.01	0.00	0.00	0.00	0.00	0.00
1995	145	1200	81.8	39.8	42.0											0.0287	0.20	0.10	0.10	0.00	0.00	0.00
1995	146	1200	80.7	35.0	45.7											0.0287	0.20	0.09	0.11	0.00	0.00	0.00
1995	146	1400	73.2	42.4	30.8											0.0287	0.02	0.01	0.01	0.00	0.00	0.00
1995	147	1145	76.2	44.3	31.9		7.7	26.3								0.0287	0.17	0.10	0.07	0.00	0.07	0.25
1995	147	1200	74.4	27.6	46.8	15.0						430				0.0287	0.00	0.00	0.00	0.18	0.00	0.00
1995	148	1200	74.0	26.1	47.9	13.2						455				0.0287	0.18	0.06	0.12	0.03	0.00	0.00
1995	149	1200	128.6	39.8	88.8	23.4						420				0.0287	0.32	0.10	0.22	0.06	0.00	0.00
1995	149	1347	77.0	41.3	35.7	28.7			130.1	8.0	17	429				0.0287	0.01	0.01	0.01	0.01	0.00	0.00
1995	150	1200	104.8	38.0	66.8											0.0273	0.23	0.08	0.15	0.00	0.00	0.00
1995	150	1400	85.1	50.6	34.5						17					0.0259	0.02	0.01	0.01	0.00	0.00	0.00
1995	151	1200	94.8	35.7	59.0											0.0247	0.19	0.07	0.12	0.00	0.00	0.00
1995	151	1327	80.7	46.5	34.2		21.4	15.8			15		29.6	56.8	0.7	0.0234	0.01	0.01	0.00	0.00	0.21	0.15
1995	152	1200	95.1	32.6	62.6											0.0234	0.18	0.06	0.12	0.00	0.00	0.00
1995	152	1345	76.1	41.3	34.8						16					0.0234	0.01	0.01	0.01	0.00	0.00	0.00
1995	153	1200	91.9	32.5	59.4											0.0234	0.17	0.06	0.11	0.00	0.00	0.00
1995	153	1430	81.0	42.7	38.3						17	459	29.9	82.5	0.8	0.0234	0.02	0.01	0.01	0.00	0.00	0.00
1995	154	0930	163.6	59.6	104.0	45.8	88.7	25.0				437	28.8	81.9	0.8	0.0287	0.32	0.12	0.20	0.09	0.70	0.20
1995	154	1200	101.8	37.1	64.7											0.0314	0.03	0.01	0.02	0.00	0.00	0.00
1995	154	1400	93.0	53.3	39.7	40.3	72.6	55.9	195.3	7.9		472	33.4	77.3	0.9	0.0350	0.02	0.01	0.01	0.02	0.04	0.03
1995	154	1600	104.7	57.2	47.6											0.0350	0.03	0.01	0.01	0.00	0.00	0.00
1995	154	1910	83.9	52.2	31.7	36.3	56.4	38.1				438	33.5	78.5	0.7	0.0350	0.03	0.02	0.01	0.02	0.03	0.02
1995	154	2000	100.7	47.9	52.8											0.0350	0.02	0.01	0.01	0.00	0.00	0.00
1995	155	0000	96.7	50.1	46.6											0.0350	0.05	0.03	0.03	0.00	0.00	0.00
1995	155	0400	98.2	55.2	43.0											0.0350	0.05	0.03	0.02	0.00	0.00	0.00
1995	155	0800	99.6	49.4	50.2											0.0350	0.05	0.02	0.03	0.00	0.00	0.00
1995	155	1200	96.9	48.7	48.3											0.0350	0.05	0.02	0.02	0.00	0.00	0.00
1995	155	1330	96.2	55.4	40.8	39.1	56.8	36.2								0.0350	0.02	0.01	0.01	0.09	0.14	0.09
1995	156	1200	145.5	55.6	90.0											0.0350	0.41	0.16	0.26	0.00	0.00	0.00
1995	156	1400	102.2	68.3	33.9	45.0			181.6	7.9						0.0350	0.03	0.02	0.01	0.14	0.00	0.00
1995	157	1200	120.0	52.6	67.4											0.0292	0.28	0.12	0.16	0.00	0.00	0.00
1995	158	1200	119.7	57.4	62.3											0.0292	0.30	0.14	0.16	0.00	0.00	0.00
1995	158	1217	105.8	68.7	37.1		124.0	97.1			13		27.8	88.2	1.0	0.0234	0.00	0.00	0.00	0.00	0.99	0.77

Appendix E2

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1995	159	1200	117.9	57.4	60.5											0.0212	0.21	0.10	0.11	0.00	0.00	0.00
1995	160	1200	125.9	55.6	70.3											0.0212	0.23	0.10	0.13	0.00	0.00	0.00
1995	161	1200	130.2	61.4	68.8											0.0212	0.24	0.11	0.13	0.00	0.00	0.00
1995	161	1200	114.2	71.2	43.0						14					0.0190	0.00	0.00	0.00	0.00	0.00	0.00
1995	162	1200	152.0	66.4	85.6											0.0150	0.25	0.11	0.14	0.00	0.00	0.00
1995	163	1200	138.4	72.3	66.2											0.0190	0.23	0.12	0.11	0.00	0.00	0.00
1995	163	1330	127.8	80.7	47.2	56.2	167.1	93.6	217.5	8.1		495				0.0190	0.01	0.01	0.00	0.77	1.48	0.83
1995	164	1200	142.1	65.7	76.4											0.0424	0.29	0.13	0.15	0.00	0.00	0.00
1995	164	1348	173.2	108.5	64.7		156.9	91.9								0.0424	0.00	0.00	0.00	0.00	0.00	0.00
1995	164	1348	240.8	83.6	157.2		167.0	89.2								0.0234	0.04	0.01	0.03	0.00	0.36	0.19
1995	165	1200	143.2	55.8	87.4											0.0234	0.30	0.12	0.19	0.00	0.00	0.00
1995	165	1449	127.1	71.9	55.2					8.1	17		32.7	87.8	0.9	0.0234	0.04	0.02	0.02	0.00	0.00	0.00
1995	166	1200	145.4	74.8	70.6											0.0234	0.31	0.16	0.15	0.00	0.00	0.00
1995	166	1400	126.0	72.6	53.4						17					0.0234	0.03	0.02	0.01	0.00	0.00	0.00
1995	167	1200	142.1	79.6	62.5											0.0261	0.31	0.17	0.13	0.00	0.00	0.00
1995	167	2100	164.4	84.4	80.0	59.6	158.9	65.7				445	23.2	93.7	1.2	0.0287	0.13	0.07	0.06	0.59	1.23	0.51
1995	167	2100	351.2	75.6	275.6	52.7	(157.6)	(45.5)				435	21.9	71.4	1.5	0.0287	0.00	0.00	0.00	0.00	0.00	0.00
1995	168	0000	186.6	64.9	121.7	49.8										0.0319	0.05	0.02	0.03	0.01	0.00	0.00
1995	168	0400	148.3	65.6	82.7	51.6										0.0319	0.06	0.02	0.03	0.02	0.00	0.00
1995	168	0800	134.7	62.1	72.7	50.1										0.0319	0.07	0.03	0.04	0.03	0.00	0.00
1995	168	0911	139.4	67.4	72.0	52.7	102.7	88.2					31.8	93.5	1.0	0.0319	0.02	0.01	0.01	0.01	0.13	0.11
1995	168	1200	153.6	59.3	94.3				217.9	8.0						0.0319	0.06	0.02	0.04	0.00	0.00	0.00
1995	168	1600	333.1	46.8	286.3											0.0607	0.17	0.02	0.14	0.00	0.00	0.00
1995	168	1630	173.4	63.1	110.3	47.4	72.3	76.4				459	34.7	88.8	0.6	0.0513	0.01	0.00	0.01	0.04	0.07	0.07
1995	168	2000	111.7	53.9	57.8											0.0565	0.07	0.04	0.04	0.00	0.00	0.00
1995	168	2145	136.7	58.2	78.5	43.1	58.1	41.6				493	35.6	114.2	0.5	0.0617	0.04	0.02	0.02	0.04	0.05	0.04
1995	169	0000	122.7	49.6	73.1											0.0521	0.04	0.02	0.03	0.00	0.00	0.00
1995	169	0400	118.5	49.6	68.9											0.0521	0.12	0.05	0.07	0.00	0.00	0.00
1995	169	0800	116.2	39.7	76.5											0.0521	0.10	0.03	0.07	0.00	0.00	0.00
1995	169	1022	121.7	63.0	58.7	44.9	52.0	62.0			15	493	34.2	97.9	0.7	0.0425	0.05	0.03	0.03	0.12	0.14	0.16
1995	169	1200	118.8	53.2	65.6											0.0388	0.03	0.01	0.01	0.00	0.00	0.00
1995	169	1500	125.4	71.1	54.3	47.0	61.0	57.0		8.0		485	33.5	100.6	0.8	0.0350	0.05	0.03	0.02	0.03	0.04	0.03
1995	169	1600	115.6	49.7	66.0											0.0350	0.01	0.01	0.01	0.00	0.00	0.00
1995	169	2000	113.8	58.9	54.9											0.0350	0.06	0.03	0.03	0.00	0.00	0.00
1995	169	2030	118.7	65.9	52.9	44.2	60.1	65.0				479	34.2	102.9	0.9	0.0350	0.01	0.00	0.00	0.03	0.04	0.05
1995	170	0000	112.4	55.0	57.4											0.0319	0.04	0.02	0.02	0.00	0.00	0.00
1995	170	0400	105.7	53.2	52.5											0.0319	0.04	0.02	0.02	0.00	0.00	0.00

Appendix E2

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1995	170	0800	109.9	49.6	60.3											0.0319	0.05	0.02	0.02	0.00	0.00	0.00
1995	170	0836	101.5	65.5	36.0	56.1	68.8	74.4				490	33.3	16.9	1.0	0.0287	0.01	0.00	0.00	0.07	0.09	0.09
1995	170	1200	117.8	59.9	57.9											0.0356	0.04	0.02	0.02	0.00	0.00	0.00
1995	170	1600	147.9	54.3	93.6											0.0356	0.06	0.02	0.04	0.00	0.00	0.00
1995	170	1930	370.5	45.3	325.2	38.7	66.5	79.7				449	32.5	81.1	0.7	0.0425	0.13	0.02	0.11	0.04	0.07	0.09
1995	170	2000	182.7	61.4	121.3											0.0425	0.01	0.00	0.01	0.00	0.00	0.00
1995	171	0000	133.0	67.7	65.3											0.0425	0.08	0.04	0.04	0.00	0.00	0.00
1995	171	0400	148.3	64.5	83.8											0.0425	0.09	0.04	0.05	0.00	0.00	0.00
1995	171	0800	117.4	65.3	52.1											0.0425	0.07	0.04	0.03	0.00	0.00	0.00
1995	171	0921	112.5	68.8	43.7	55.7	46.2	30.6		8.0	10	418	30.2	95.6	1.0	0.0425	0.03	0.02	0.01	0.12	0.10	0.07
1995	171	1200	131.7	68.1	63.6											0.0425	0.05	0.03	0.02	0.00	0.00	0.00
1995	171	1600	118.2	75.0	43.2											0.0425	0.07	0.05	0.03	0.00	0.00	0.00
1995	171	1925	109.9	70.3	39.6	53.8	59.5	27.3	184.8	8.0		437	31.3	104.0	1.0	0.0425	0.06	0.04	0.02	0.08	0.09	0.04
1995	171	2000	133.1	77.9	55.2											0.0388	0.01	0.01	0.00	0.00	0.00	0.00
1995	172	0000	116.4	67.4	49.0											0.0388	0.07	0.04	0.03	0.00	0.00	0.00
1995	172	0400	112.8	68.8	44.0											0.0388	0.07	0.04	0.03	0.00	0.00	0.00
1995	172	0800	114.9	68.5	46.4											0.0388	0.08	0.05	0.03	0.00	0.00	0.00
1995	172	1000	114.6	78.7	35.8	53.0	64.0	40.8			12	430	32.1	98.5	1.1	0.0350	0.04	0.02	0.01	0.12	0.15	0.09
1995	172	1200	113.1	80.1	33.0											0.0432	0.03	0.02	0.01	0.00	0.00	0.00
1995	172	1600	127.3	83.0	44.3											0.0432	0.06	0.04	0.02	0.00	0.00	0.00
1995	172	2000	379.7	85.2	294.5											0.0432	2.32	0.52	1.80	0.00	0.00	0.00
1995	173	0000	424.7	169.4	255.3											0.0432	2.36	0.94	1.42	0.00	0.00	0.00
1995	173	0400	324.1	160.3	163.8											0.0432	0.56	0.28	0.29	0.00	0.00	0.00
1995	173	0800	247.6	140.9	106.8											0.0432	0.27	0.16	0.12	0.00	0.00	0.00
1995	173	1100	239.4	141.2	98.2	107.0	49.2	64.8					15.0	43.9	2.2	0.0513	0.15	0.09	0.06	1.70	0.78	1.03
1995	173	1200	227.7	130.0	97.7											0.0432	0.03	0.02	0.01	0.00	0.00	0.00
1995	173	1600	218.9	118.3	100.6											0.0432	0.12	0.06	0.05	0.00	0.00	0.00
1995	173	2000	192.8	108.9	83.9											0.0432	0.10	0.05	0.04	0.00	0.00	0.00
1995	174	0000	193.9	113.6	80.3											0.0432	0.12	0.07	0.05	0.00	0.00	0.00
1995	174	0400	189.2	112.9	76.3											0.0432	0.12	0.07	0.05	0.00	0.00	0.00
1995	174	0800	180.4	106.7	73.7											0.0432	0.11	0.06	0.04	0.00	0.00	0.00
1995	174	1200	183.0	106.0	77.0											0.0432	0.08	0.05	0.03	0.00	0.00	0.00
1995	174	1230	192.9	112.1	80.8	83.5	46.6	68.5								0.0350	0.01	0.01	0.01	0.29	0.16	0.24
1995	175	1200	212.7	108.2	104.5											0.0305	0.68	0.34	0.33	0.00	0.00	0.00
1995	175	1420	175.6	113.9	61.7	80.2	46.9	33.7								0.0259	0.05	0.03	0.02	0.28	0.16	0.12
1995	176	1200	176.3	90.2	86.1											0.0247	0.36	0.19	0.18	0.00	0.00	0.00
1995	176	1443	167.4	112.2	55.2	77.3	48.1	36.9			17					0.0234	0.04	0.02	0.01	0.18	0.11	0.08

Appendix E2

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1995	177	1200	214.5	83.3	131.1											0.0330	1.14	0.44	0.70	0.00	0.00	0.00
1995	177	1440	173.9	90.0	83.9	62.2	13.5	21.9				293				0.0425	0.10	0.05	0.05	0.37	0.08	0.13
1995	178	0918	146.7	86.4	60.3	62.9	28.7	30.7	137.6	7.8		317				0.0317	0.47	0.28	0.19	0.20	0.09	0.10
1995	178	1200	181.7	84.0	97.7											0.0276	0.06	0.03	0.03	0.00	0.00	0.00
1995	179	1345	145.6	98.1	47.5											0.0234	0.45	0.30	0.15	0.00	0.00	0.00
1995	180	1423	133.7	89.9	43.8					7.9						0.0234	0.28	0.19	0.09	0.00	0.00	0.00
1995	181	1400	135.1	96.0	39.1											0.0234	0.27	0.19	0.08	0.00	0.00	0.00
1995	182	1445	137.3	95.0	42.3		74.0	43.5			15		22.1	59.0	1.2	0.0211	0.31	0.22	0.10	0.00	0.72	0.42
1995	183	1430	160.5	93.1	67.4						15					0.0234	0.85	0.50	0.36	0.00	0.00	0.00
1995	184															0.0234	0.00	0.00	0.00	0.00	0.00	0.00
1995	185	1149	159.2	103.8	55.4	77.7	66.7	22.1	152.4	7.7		387				0.0234	0.60	0.39	0.21	1.47	0.61	0.20
1995	186	0920	158.9	112.4	46.5						15		19.6	71.0	1.2	0.0287	0.31	0.22	0.09	0.00	0.00	0.00
1995	187	1400	143.1	92.7	50.4					8.0		407				0.0234	0.38	0.24	0.13	0.00	0.00	0.00
1995	188	1043	135.6	99.5	36.1											0.0211	0.23	0.17	0.06	0.00	0.00	0.00
1995	189	1200	145.6	72.3	73.3											0.0201	0.24	0.12	0.12	0.00	0.00	0.00
1995	190	1100	142.3	88.7	53.6	69.0	84.7	43.9	189.2	7.8	17		19.8	62.0	1.4	0.0190	0.21	0.13	0.08	0.65	0.80	0.42
1995	190	1200	139.1	80.2	58.9											0.0212	0.01	0.00	0.00	0.00	0.00	0.00
1995	191	1200	192.4	72.0	120.4											0.0212	0.40	0.15	0.25	0.00	0.00	0.00
1995	192	0944	154.8	97.7	57.1							419				0.0234	0.23	0.15	0.09	0.00	0.00	0.00
1995	192	1200	180.2	83.0	97.2											0.0234	0.04	0.02	0.02	0.00	0.00	0.00
1995	193	1200	148.0	82.3	65.7											0.0234	0.32	0.18	0.14	0.00	0.00	0.00
1995	194	0912	158.4	106.7	51.7											0.0234	0.26	0.17	0.08	0.00	0.00	0.00
1995	194	1200	150.5	87.7	62.8											0.0234	0.03	0.02	0.01	0.00	0.00	0.00
1995	195	1200	134.0	76.5	57.5											0.0234	0.24	0.14	0.10	0.00	0.00	0.00
1995	196	1117	150.9	77.3	73.6											0.0234	0.48	0.25	0.23	0.00	0.00	0.00
1995	196	1200	151.6	74.0	77.6											0.0194	0.01	0.00	0.00	0.00	0.00	0.00
1995	197	1200	170.2	64.3	105.9											0.0194	0.29	0.11	0.18	0.00	0.00	0.00
1995	198	0938	192.1	122.1	70.0	92.7	44.4	36.3	136.5	7.7		315	11.2	43.5	1.7	0.0194	0.29	0.18	0.11	1.49	0.71	0.58
1995	198	1200	173.5	98.8	74.7											0.0194	0.03	0.02	0.01	0.00	0.00	0.00
1995	199	1200	150.3	92.0	58.3											0.0194	0.36	0.22	0.14	0.00	0.00	0.00
1995	200	1021	149.9	106.7	43.2											0.0153	0.26	0.18	0.07	0.00	0.00	0.00
1995	200	1200	145.9	95.6	50.3											0.0153	0.01	0.01	0.00	0.00	0.00	0.00
1995	201	1200	217.9	71.8	146.1											0.0153	0.33	0.11	0.22	0.00	0.00	0.00
1995	202	0945	149.9	103.1	46.8											0.0153	0.20	0.14	0.06	0.00	0.00	0.00
1995	202	1200	143.8	89.8	54.0											0.0172	0.02	0.01	0.01	0.00	0.00	0.00
1995	203	1200	142.7	69.3	73.4											0.0172	0.21	0.10	0.11	0.00	0.00	0.00
1995	204	1200	174.0	70.8	103.2											0.0172	0.26	0.11	0.16	0.00	0.00	0.00

Appendix E2

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1995	205	0940	153.1	93.1	60.0	76.1	67.4	41.4	222.7	7.9		479	19.5	67.8	1.5	0.0172	0.21	0.13	0.08	0.90	0.79	0.49
1995	205	1200	162.1	86.9	75.2											0.0172	0.02	0.01	0.01	0.00	0.00	0.00
1995	206	1200	164.6	58.1	106.5											0.0172	0.24	0.09	0.16	0.00	0.00	0.00
1995	207	0922	159.9	96.4	63.5											0.0190	0.22	0.13	0.09	0.00	0.00	0.00
1995	207	1200	153.7	68.9	94.8											0.0190	0.03	0.01	0.02	0.00	0.00	0.00
1995	208	1200	160.6	72.0	88.6											0.0190	0.26	0.11	0.14	0.00	0.00	0.00
1995	209	0940	157.0	82.9	74.1											0.0190	0.22	0.12	0.10	0.00	0.00	0.00
1995	209	1200	171.9	63.6	108.3											0.0190	0.02	0.01	0.02	0.00	0.00	0.00
1995	210	1200	167.2	76.0	91.2											0.0190	0.24	0.11	0.13	0.00	0.00	0.00
1995	211	1200	166.4	59.2	107.2											0.0190	0.26	0.09	0.17	0.00	0.00	0.00
1995	212	1005	148.9	96.8	52.1	66.1	61.3	35.1	234.2	8.0		608	23.4	90.9	1.4	0.0190	0.25	0.16	0.09	0.72	0.67	0.38
1995	212	1200	151.5	60.0	91.5											0.0190	0.02	0.01	0.01	0.00	0.00	0.00
1995	213	1200	147.9	67.5	80.4											0.0190	0.24	0.11	0.13	0.00	0.00	0.00
1995	214	1000	151.9	78.6	73.3											0.0190	0.23	0.12	0.11	0.00	0.00	0.00
1995	214	1200	157.7	63.1	94.6											0.0172	0.02	0.01	0.01	0.00	0.00	0.00
1995	215	1200	149.3	67.7	81.6											0.0172	0.18	0.08	0.10	0.00	0.00	0.00
1995	216	0937	145.6	86.4	59.2											0.0153	0.16	0.09	0.06	0.00	0.00	0.00
1995	216	1200	150.0	69.9	80.1											0.0172	0.02	0.01	0.01	0.00	0.00	0.00
1995	217	1200	237.5	51.9	185.6											0.0172	0.81	0.18	0.64	0.00	0.00	0.00
1995	218	1200	182.8	75.4	107.4											0.0172	0.45	0.19	0.27	0.00	0.00	0.00
1995	219	1000	178.3	90.5	87.8	70.5	49.4	45.6	216.6	8.0		546	20.4	83.8	1.6	0.0190	0.37	0.19	0.18	0.97	0.68	0.63
1995	219	1200	181.7	87.5	94.2											0.3642	0.02	0.01	0.01	0.00	0.00	0.00
1995	220	1440	648.6	94.9	553.7	58.1	27.5	26.9				288	11.7	38.2	1.6	0.7093	3.60	0.53	3.07	0.33	0.16	0.15
1995	220	1600	766.2	78.7	687.5											1.4009	3.85	0.40	3.46	0.00	0.00	0.00
1995	220	2000	472.8	87.2	385.6											1.4009	17.80	3.28	14.52	0.00	0.00	0.00
1995	221	0000	623.6	108.1	515.5											1.4009	39.48	6.84	32.64	0.00	0.00	0.00
1995	221	0900	303.3	142.0	161.3	109.1	19.1	22.8				182	4.0	24.9	1.3	2.0925	29.96	14.03	15.94	22.34	3.91	4.67
1995	221	1200	333.7	138.2	195.5											1.6315	7.69	3.18	4.50	0.00	0.00	0.00
1995	221	1330	286.3	143.2	143.1	98.5	17.1	21.9	77.7	7.9		171	3.9	24.6	1.4	1.6315	3.24	1.62	1.62	3.38	0.59	0.75
1995	221	2000	325.8	122.8	203.0											1.6315	13.54	5.10	8.44	0.00	0.00	0.00
1995	222	1000	185.9	104.5	81.4	76.9	17.2	39.1				175	3.3	24.3	1.0	1.1704	14.00	7.87	6.13	8.99	2.01	4.57
1995	222	1200	170.3	97.6	72.7											1.1032	1.44	0.82	0.61	0.00	0.00	0.00
1995	222	1525	165.8	105.5	60.3	74.4	11.5	113.1				171	3.1	23.4	1.0	1.0360	2.45	1.56	0.89	1.72	0.27	2.62
1995	222	1600	172.1	95.4	76.7											0.8292	0.32	0.18	0.14	0.00	0.00	0.00
1995	222	2000	155.2	83.9	71.3											0.8292	2.32	1.25	1.06	0.00	0.00	0.00
1995	223	0000	157.4	84.2	73.2											0.8292	2.35	1.26	1.09	0.00	0.00	0.00
1995	223	0400	154.8	74.2	80.6											0.8292	2.24	1.07	1.17	0.00	0.00	0.00

Appendix E2

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1995	223	0800	158.4	70.9	87.5											0.8292	2.09	0.93	1.16	0.00	0.00	0.00
1995	223	0955	151.8	89.8	62.0	57.9	10.5	41.0				171	2.8	23.2	0.8	0.6223	0.86	0.51	0.35	3.77	0.68	2.67
1995	223	1200	147.7	81.7	66.0											0.6658	0.66	0.37	0.30	0.00	0.00	0.00
1995	223	1600	139.5	78.9	60.6											0.6658	1.23	0.70	0.53	0.00	0.00	0.00
1995	223	2000	128.9	80.3	48.6											0.6658	1.14	0.71	0.43	0.00	0.00	0.00
1995	224	0000	143.4	80.7	62.7											0.6658	1.31	0.74	0.57	0.00	0.00	0.00
1995	224	0400	147.2	77.8	69.4											0.6658	1.53	0.81	0.72	0.00	0.00	0.00
1995	224	0800	144.5	78.6	65.9											0.6658	1.48	0.80	0.67	0.00	0.00	0.00
1995	224	0945	134.6	85.3	49.3	59.0	8.7	27.7	67.5	7.4		148	2.5	22.6	0.7	0.7093	0.52	0.33	0.19	3.28	0.48	1.54
1995	224	1200	123.9	73.6	50.3											0.6658	0.90	0.53	0.37	0.00	0.00	0.00
1995	224	1600	126.4	73.2	53.2											0.6658	1.47	0.85	0.62	0.00	0.00	0.00
1995	224	2000	125.7	73.9	51.8											0.6658	1.46	0.86	0.60	0.00	0.00	0.00
1995	225	0000	138.4	79.6	58.8											0.6658	1.61	0.92	0.68	0.00	0.00	0.00
1995	225	0400	127.1	77.1	50.0											0.6658	1.48	0.90	0.58	0.00	0.00	0.00
1995	225	0800	123.9	74.7	49.2											0.6658	1.44	0.87	0.57	0.00	0.00	0.00
1995	225	1000	144.9	98.1	46.8	57.9	10.1	28.5		7.6		159	2.6	21.9	0.7	0.6223	0.72	0.49	0.23	4.07	0.71	2.00
1995	225	1200	141.6	77.5	64.1											0.5835	0.63	0.35	0.29	0.00	0.00	0.00
1995	225	1600	121.1	79.6	41.5											0.5835	1.09	0.71	0.37	0.00	0.00	0.00
1995	225	2000	118.2	76.4	41.8											0.5835	0.94	0.61	0.33	0.00	0.00	0.00
1995	226	0000	132.8	80.0	52.8											0.5835	1.19	0.72	0.47	0.00	0.00	0.00
1995	226	0400	129.2	76.4	52.8											0.5835	1.18	0.70	0.48	0.00	0.00	0.00
1995	226	0800	127.1	80.0	47.1											0.5835	1.30	0.82	0.48	0.00	0.00	0.00
1995	226	0930	122.5	80.0	42.5	58.7	10.5	21.2				162		21.0	0.7	0.5447	0.41	0.27	0.14	3.12	0.56	1.13
1995	226	1200	125.4	75.1	50.3											0.4944	0.63	0.38	0.25	0.00	0.00	0.00
1995	226	1600	120.1	69.0	51.1											0.4944	0.94	0.54	0.40	0.00	0.00	0.00
1995	226	2000	116.2	72.9	43.3											0.4944	0.90	0.56	0.33	0.00	0.00	0.00
1995	227	0000	124.7	68.9	55.8											0.4944	0.98	0.54	0.44	0.00	0.00	0.00
1995	227	0400	119.0	75.4	43.6											0.4944	0.93	0.59	0.34	0.00	0.00	0.00
1995	227	0800	140.7	79.3	61.4											0.4944	1.10	0.62	0.48	0.00	0.00	0.00
1995	227	1000	125.4	82.5	42.9	56.5	21.3	17.7				167	2.5	21.9	0.7	0.4440	0.49	0.32	0.17	2.72	1.02	0.85
1995	227	1200	137.0	81.9	55.1											0.4151	0.47	0.28	0.19	0.00	0.00	0.00
1995	227	1600	126.3	77.3	49.0											0.4151	0.77	0.47	0.30	0.00	0.00	0.00
1995	228	1000	119.9	79.4	40.5	56.6	9.5	16.6				171	2.4	21.9	0.7	0.3861	3.59	2.38	1.21	2.23	0.37	0.65
1995	229	0930	143.1	92.4	50.7	70.2	14.5	20.7	68.1	8.1		222	2.5	22.5	0.8	0.1701	5.94	3.83	2.10	2.91	0.60	0.86
1995	230															0.2196	0.00	0.00	0.00	0.00	0.00	0.00
1995	231	1340	145.9	99.4	46.5					7.8		239	2.2	21.8	0.9	0.2691	28.08	19.13	8.95	0.00	0.00	0.00
1995	232	1200	257.7	85.8	171.9											0.1785	2.69	0.89	1.79	0.00	0.00	0.00

Appendix E2

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1995	233	1000	140.5	79.8	60.7		29.5	37.7				224	4.0			0.0879	1.07	0.61	0.46	0.00	6.21	7.94
1995	233	1200	150.0	86.1	63.9											0.0879	0.09	0.05	0.04	0.00	0.00	0.00
1995	234	1000	138.7	94.5	44.2	74.7			86.1	7.75(8.06)		238				0.0879	0.97	0.66	0.31	16.29	0.00	0.00
1995	234	1200	135.9	90.7	45.2											0.0809	0.08	0.05	0.03	0.00	0.00	0.00
1995	235	1000	142.8	98.8	43.9											0.0738	1.01	0.70	0.31	0.00	0.00	0.00
1995	235	1200	136.7	92.4	44.3											0.1094	0.07	0.05	0.02	0.00	0.00	0.00
1995	236	1200	145.4	84.7	60.7											0.1094	0.97	0.57	0.41	0.00	0.00	0.00
1995	237	1000	131.0	86.3	44.7											0.1450	1.86	1.23	0.63	0.00	0.00	0.00
1995	237	1200	139.2	81.7	57.5											0.1007	0.15	0.09	0.06	0.00	0.00	0.00
1995	238	1200	198.9	83.1	115.8											0.1007	1.04	0.43	0.60	0.00	0.00	0.00
1995	239	1200	123.5	86.7	36.8											0.1007	0.29	0.28	0.12	0.00	0.00	0.00
1995	240	1000	135.3	93.5	41.8	68.2	30.3	40.5	88.5	8.2		650	5.6	28.6	1.2	0.0563	0.48	0.33	0.15	2.87	1.50	2.01
1995	240	1200	137.8	86.0	51.8											0.0563	0.05	0.03	0.02	0.00	0.00	0.00
1995	241	1200	120.8	88.2	32.6											0.0563	0.51	0.37	0.14	0.00	0.00	0.00
1995	242	0940	130.8	97.1	33.7											0.0563	0.52	0.38	0.13	0.00	0.00	0.00
1995	242	1200	119.1	86.1	33.0											0.0494	0.05	0.04	0.01	0.00	0.00	0.00
1995	243	1200	123.3	85.4	37.9											0.0494	0.52	0.36	0.16	0.00	0.00	0.00
1995	244	1000	138.6	89.3	49.3											0.0425	0.53	0.34	0.19	0.00	0.00	0.00
1995	244	1200	123.7	90.0	33.7											0.0388	0.04	0.03	0.01	0.00	0.00	0.00
1995	245	1200	113.7	81.8	31.9											0.0388	0.44	0.32	0.12	0.00	0.00	0.00
1995	246	1200	112.0	66.9	45.1											0.0388	0.51	0.30	0.20	0.00	0.00	0.00
1995	247	1000	129.0	93.2	35.8	71.1	20.4	16.5	102.5	7.7		218	6.5	33.1		0.0350	0.39	0.28	0.11	2.04	0.58	0.47
1995	247	1200	115.8	74.2	41.6											0.0350	0.02	0.01	0.01	0.00	0.00	0.00
1995	248	1200	115.8	83.5	32.3											0.0350	0.22	0.16	0.06	0.00	0.00	0.00
1995	249	1200	121.7	76.2	45.5											0.0350	0.18	0.11	0.07	0.00	0.00	0.00
1995	250	0945	148.1	96.4	51.7											0.0350	0.35	0.23	0.12	0.00	0.00	0.00
1995	250	1200	153.7	87.4	66.3											0.0292	0.04	0.02	0.02	0.00	0.00	0.00
1995	251	1200	132.2	90.8	41.4											0.0292	0.31	0.21	0.10	0.00	0.00	0.00
1995	252	1200	148.8	87.7	61.1											0.0292	0.40	0.23	0.16	0.00	0.00	0.00
1995	253	1200	138.8	86.0	52.8											0.0292	0.31	0.19	0.12	0.00	0.00	0.00
1995	254	0945	132.5	94.3	38.2	73.7	25.7	11.3	138.4	7.5	14	280	8.7	41.2		0.0234	0.22	0.16	0.06	1.11	0.39	0.17
1995	254	1200	130.1	86.3	43.8											0.0234	0.02	0.01	0.01	0.00	0.00	0.00
1995	255	1200	119.9	76.1	43.8											0.0234	0.18	0.11	0.06	0.00	0.00	0.00
1995	256	1200	113.7	73.6	40.1											0.0234	0.18	0.11	0.06	0.00	0.00	0.00
1995	257	1000	108.9	82.3	26.6											0.0234	0.16	0.12	0.04	0.00	0.00	0.00
1995	257	1200	104.0	74.3	29.7											0.0292	0.02	0.01	0.00	0.00	0.00	0.00
1995	258	1200	107.8	69.5	38.3											0.0292	0.18	0.12	0.06	0.00	0.00	0.00

Appendix E2

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1995	259	1200	113.7	65.7	48.0											0.0292	0.22	0.12	0.09	0.00	0.00	0.00
1995	260	1200	204.8	95.4	109.4											0.0292	0.24	0.11	0.13	0.00	0.00	0.00
1995	261	1000	175.8	102.3	73.5	82.1	15.6	10.1	94.6	7.8	6	218	4.7	25.4		0.0350	0.36	0.21	0.15	0.95	0.18	0.12
1995	261	1200	179.6	107.8	71.8											0.0270	0.05	0.03	0.02	0.00	0.00	0.00
1995	262	1200	140.2	93.5	46.7											0.0270	0.39	0.26	0.13	0.00	0.00	0.00
1995	263	1200	148.6	86.9	61.7											0.0270	0.33	0.19	0.14	0.00	0.00	0.00
1995	264	1000	131.9	89.7	42.2											0.0190	0.24	0.17	0.08	0.00	0.00	0.00
1995	264	1200	157.0	92.8	64.2											0.0212	0.02	0.01	0.01	0.00	0.00	0.00
1995	265															0.0212	0.00	0.00	0.00	0.00	0.00	0.00
1995	266															0.0212	0.00	0.00	0.00	0.00	0.00	0.00
1995	267															0.0212	0.00	0.00	0.00	0.00	0.00	0.00
1995	268	0945	149.3	88.0	61.3	72.3	17.4	3.5	128.2	7.6	7	495	10.7	35.0		0.0234	1.13	0.66	0.46	1.07	0.26	0.05
1995	269	1200	126.5	79.0	47.5											0.0212	0.25	0.15	0.09	0.00	0.00	0.00
1995	270	1200	119.4	69.8	49.6											0.0212	0.18	0.11	0.08	0.00	0.00	0.00
1995	271	1000	119.4	77.9	41.5											0.0190	0.15	0.09	0.05	0.00	0.00	0.00
1995	271	1200	126.8	66.3	60.5											0.0239	0.02	0.01	0.01	0.00	0.00	0.00
1995	272	1200	105.6	63.8	41.8											0.0239	0.16	0.10	0.06	0.00	0.00	0.00
1995	273	1200	112.3	55.3	57.0											0.0239	0.18	0.09	0.09	0.40	0.14	0.03

Appendix E3: Physical and chemical data collected from the agricultural watershed A1 for 1994 and 1995.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1994	125	0900	254.6	180.1	74.4					7.2		575				0.0166	0.32	0.23	0.09			
1994	127	0830	223.7	197.0	26.8					7.0	10	600				0.0134	0.57	0.50	0.07			
1994	130	0930	218.7	212.2	6.5					7.4	9	641				0.0102	0.68	0.66	0.02			
1994	133	0930	310.0	209.6	100.4					7.5	8	668				0.0102	0.82	0.55	0.27			
1994	136	0300	653.4	213.9	439.5	182.4				7.6	8	700				0.0069	1.32	0.43	0.89			
1994	136	0730	348.1	275.9	72.2	243.5				7.6		720				0.0069	0.04	0.03	0.01			
1994	136	1330	348.4	321.2	27.2	278.0				7.5		673				0.0134	0.08	0.07	0.01			
1994	136	2000	347.0	315.8	31.2	269.5				7.9		710				0.0197	0.13	0.12	0.01			
1994	137	0730	282.7	267.0	15.7	217.6				7.5	7	730				0.0166	0.21	0.20	0.01			
1994	137	1930	273.3	253.0	20.3	202.9				7.4	8	720				0.0134	0.18	0.16	0.01			
1994	139	0930	247.6	237.5	10.1	196.8				7.6	8	735				0.0134	0.45	0.44	0.02			
1994	140	1940	256.5	243.0	13.5	206.2				7.6		715				0.0166	0.47	0.45	0.02			
1994	141	0830	312.5	292.1	20.4	242.2				7.6		686				0.0197	0.27	0.25	0.02			
1994	141	2000	344.1	320.0	24.1	282.1				7.9		699				0.0197	0.28	0.26	0.02			
1994	142	1430	319.0	306.8	12.2	270.0				7.7		822				0.0134	0.35	0.34	0.01			
1994	143	1330	264.5	245.5	19.0	216.7				7.9		905				0.0166	0.33	0.30	0.02			
1994	145	0900	306.2	291.1	15.1	252.0				7.5		836				0.0118	0.68	0.65	0.03			
1994	147	0830	373.7	349.5	24.3	310.8				7.6	13	799				0.0118	0.75	0.71	0.05			
1994	150	1330	422.3	365.8	56.5					7.3	12	780				0.0053	1.00	0.87	0.13			
1994	152	1930	804.6	325.0	479.6							864				0.0036	0.70	0.28	0.41			
1994	153	0900	460.2	419.1	41.1							634				0.0228	0.30	0.27	0.03			
1994	153	1920	431.1	397.5	33.6					7.5		676				0.0166	0.32	0.30	0.02			
1994	154	1300	443.6	417.5	26.1					7.6		691				0.0118	0.40	0.37	0.02			
1994	155	0945	457.2	435.4	21.8							690				0.0102	0.37	0.35	0.02			
1994	157	1100	541.8	457.7	84.1					7.3		725				0.0053	0.75	0.63	0.12			
1994	159	0840								7.5						0.0000	0.00	0.00	0.00			
1994	164	0840	1344.9	332.9	1012.0					7.4		778				0.0053	2.12	0.52	1.60			
1994	164	1030	426.5	287.5	139.0					7.5		274				0.0166	0.03	0.02	0.01			
1994	164	1445	732.3	385.5	346.8						14					0.0469	0.33	0.18	0.16			
1994	164	1930	549.6	386.1	163.5							570				0.0455	0.46	0.32	0.14			
1994	164	2330	414.8	365.0	49.7							634				0.0455	0.27	0.24	0.04			
1994	165	0300	447.1	385.4	61.7							602				0.0455	0.29	0.25	0.04			
1994	165	0000	421.4	344.6	76.8							706				0.0455	0.28	0.23	0.05			
1994	165	1130	422.1	374.7	47.4							672				0.0455	0.28	0.25	0.03			
1994	165	1330	419.6	344.6	75.0						10	643				0.0440	0.14	0.11	0.02			
1994	165	1730	368.2	302.1	66.1						10	556				0.0350	0.21	0.17	0.04			
1994	165	2130	361.3	289.7	71.6							559				0.0365	0.19	0.15	0.04			

Appendix E3

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1994	165	2140	375.1	302.9	72.2							573				0.0380	0.00	0.00	0.00			
1994	166	0130	328.4	291.9	36.5							567				0.0380	0.18	0.16	0.02			
1994	166	0530	331.0	289.4	41.6							564				0.0380	0.18	0.16	0.02			
1994	166	0900														0.0380	0.00	0.00	0.00			
1994	166	0930	323.0	272.9	50.1							549				0.0370	0.17	0.15	0.03			
1994	166	1330	311.3	277.7	33.6							556				0.0370	0.17	0.15	0.02			
1994	166	1730	310.5	275.9	34.6						12	559				0.0370	0.17	0.15	0.02			
1994	166	1930			0.0											0.0350	0.00	0.00	0.00			
1994	166	2330	293.9	277.2	16.7							570				0.0305	0.21	0.20	0.01			
1994	167	0330	290.3	264.8	25.5							570				0.0305	0.13	0.12	0.01			
1994	167	0730	283.4	261.2	22.2							586				0.0305	0.12	0.11	0.01			
1994	167	1130	280.8	260.1	20.7							583				0.0305	0.12	0.11	0.01			
1994	167	1530	280.8	260.2	20.6							576				0.0305	0.12	0.11	0.01			
1994	167	1600									11					0.0259	0.00	0.00	0.00			
1994	167	2000	279.7	245.2	34.5							587				0.0236	0.11	0.10	0.01			
1994	168	0000	276.7	245.4	31.3							590				0.0236	0.09	0.08	0.01			
1994	168	0400	272.2	248.7	23.5							595				0.0236	0.09	0.08	0.01			
1994	168	0800	271.5	247.2	24.3							607				0.0236	0.09	0.08	0.01			
1994	168	1200	277.6	254.4	23.2							599				0.0236	0.09	0.09	0.01			
1994	168	1600	274.0	253.0	21.0							596				0.0236	0.09	0.09	0.01			
1994	168	2000	280.1	91.5	188.6							593				0.0236	0.10	0.03	0.06			
1994	169	0000	282.0	260.2	21.8							605				0.0236	0.10	0.09	0.01			
1994	169	0400	301.5	264.9	36.6							589				0.0236	0.10	0.09	0.01			
1994	169	0800	294.6	272.5	22.1							598				0.0236	0.10	0.09	0.01			
1994	169	0830														0.0212	0.00	0.00	0.00			
1994	169	1230	268.5	206.4	62.1							605				0.0157	0.08	0.06	0.02			
1994	169	1630	281.5	230.1	51.4							613				0.0157	0.06	0.05	0.01			
1994	169	2030	286.8	248.8	38.0							625				0.0157	0.06	0.06	0.01			
1994	170	0030	315.6	267.1	48.5							625				0.0157	0.07	0.06	0.01			
1994	170	0430	311.6	279.7	31.9							625				0.0157	0.07	0.06	0.01			
1994	170	0830	325.6	304.4	21.2							633				0.0157	0.07	0.07	0.00			
1994	170	1230	332.1	304.8	27.3							625				0.0157	0.08	0.07	0.01			
1994	170	1630	321.3	292.9	28.4							640				0.0157	0.07	0.07	0.01			
1994	170	2030	333.5	312.7	20.8							632				0.0157	0.08	0.07	0.00			
1994	171	0030	351.5	329.3	22.3							631				0.0157	0.08	0.07	0.01			
1994	171	0430	366.1	345.7	20.4							635				0.0157	0.08	0.08	0.00			
1994	171	0830	363.6	343.1	20.5							643				0.0157	0.08	0.08	0.00			

Appendix E3

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1994	171	1230	374.1	352.6	21.5							642				0.0157	0.08	0.08	0.00			
1994	171	1310														0.0102	0.00	0.00	0.00			
1994	171	1700	409.2	380.7	28.5							245				0.0102	0.07	0.06	0.00			
1994	171	2100	405.9	369.0	36.9							626				0.0102	0.06	0.05	0.01			
1994	172	0100	414.3	387.6	26.7							632				0.0102	0.06	0.06	0.00			
1994	172	0500	418.7	403.3	15.4							626				0.0102	0.06	0.06	0.00			
1994	172	0900	432.1	405.2	26.9							640				0.0102	0.06	0.06	0.00			
1994	172	1330									15					0.0102	0.00	0.00	0.00			
1994	178	1000														0.0086	0.00	0.00	0.00			
1994	179	1400									15					0.0069	0.00	0.00	0.00			
1994	180	0900	497.9	446.2	51.7						12					0.0150	3.78	3.38	0.39			
1994	181	1500														0.0219	0.00	0.00	0.00			
1994	182	1330	537.1	503.6	33.4						14					0.0069	1.46	1.37	0.09			
1994	183	0630	767.5	508.8	258.7											0.0675	1.75	1.16	0.59			
1994	183	1300	524.0	342.3	181.7						13					0.0762	0.88	0.58	0.31			
1994	183	1600	480.4	326.0	154.4							410				0.0933	0.44	0.30	0.14			
1994	183	2000	414.3	336.5	77.8							426				0.0933	0.70	0.57	0.13			
1994	184	0000	448.8	323.4	125.4							421				0.0933	0.45	0.33	0.13			
1994	184	0400	419.0	332.1	86.9							421				0.0933	0.56	0.45	0.12			
1994	184	0800	558.8	329.6	229.2							363				0.0933	0.75	0.44	0.31			
1994	184	0900									12					0.1104	0.00	0.00	0.00			
1994	184	1200	433.8	326.9	106.9						12	352				0.0947	0.64	0.48	0.16			
1994	184	1600	393.0	297.6	95.4							385				0.0947	0.54	0.41	0.13			
1994	184	1940														0.0790	0.00	0.00	0.00			
1994	184	2000	403.4	290.1	113.3							403				0.0762	0.45	0.32	0.13			
1994	185	0000	368.0	284.7	83.3							404				0.0762	0.40	0.31	0.09			
1994	185	0400	338.0	277.6	60.4							392				0.0762	0.37	0.30	0.07			
1994	185	0800	360.0	277.6	82.4							402				0.0762	0.39	0.30	0.09			
1994	185	0900									12					0.0733	0.00	0.00	0.00			
1994	185	1200	349.7	291.1	58.6							384				0.0719	0.37	0.30	0.06			
1994	185	1540														0.0704	0.00	0.00	0.00			
1994	185	1600	351.5	300.3	51.1							437				0.0579	0.32	0.28	0.05			
1994	185	2000	367.8	320.6	47.2							406				0.0579	0.31	0.27	0.04			
1994	186	0000	377.7	326.9	50.8							421				0.0579	0.31	0.27	0.04			
1994	186	0400	382.7	346.8	35.9							439				0.0579	0.32	0.29	0.03			
1994	186	0800	380.2	349.3	30.9							416				0.0579	0.32	0.29	0.03			
1994	186	0930									12					0.0454	0.00	0.00	0.00			

Appendix E3

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1994	186	1200	378.1	338.0	40.1						13	448				0.0417	0.24	0.21	0.03			
1994	186	1600	387.2	352.6	34.6							450				0.0417	0.23	0.21	0.02			
1994	186	2000	390.9	355.5	35.4							437				0.0417	0.23	0.21	0.02			
1994	187	0000	405.1	375.6	29.5							453				0.0417	0.24	0.23	0.02			
1994	187	0400	405.8	380.3	25.5							471				0.0417	0.24	0.23	0.02			
1994	187	0800	405.1	382.5	22.6							489				0.0417	0.24	0.23	0.01			
1994	187	1200	404.0	377.4	26.6							451				0.0417	0.24	0.23	0.02			
1994	187	1600	410.9	382.9	28.0							480				0.0417	0.25	0.23	0.02			
1994	187	2000	426.2	398.2	28.0							458				0.0417	0.26	0.24	0.02			
1994	188	0000	440.1	415.7	24.4							477				0.0417	0.26	0.25	0.01			
1994	188	0400	451.8	418.6	33.2							480				0.0417	0.27	0.25	0.02			
1994	188	0800	454.7	435.7	19.0							530				0.0417	0.27	0.26	0.01			
1994	188	0930														0.0380	0.00	0.00	0.00			
1994	188	1200	444.6	402.2	42.4							489				0.0241	0.20	0.18	0.02			
1994	188	1600	513.3	401.5	111.8							494				0.0241	0.18	0.14	0.04			
1994	188	2000	461.2	432.2	29.0							499				0.0241	0.16	0.15	0.01			
1994	189	0000	481.9	450.4	31.4							499				0.0241	0.17	0.16	0.01			
1994	189	0400	500.0	476.1	23.9							499				0.0241	0.17	0.17	0.01			
1994	189	0800	508.3	483.3	25.0							510				0.0241	0.18	0.17	0.01			
1994	189	1200	505.4	480.8	24.6							520				0.0241	0.18	0.17	0.01			
1994	189	1600	506.1	485.1	21.0							530				0.0241	0.18	0.17	0.01			
1994	189	2000	501.0	472.4	28.5							520				0.0241	0.17	0.16	0.01			
1994	190	0000	541.6	507.9	33.7							530				0.0241	0.19	0.18	0.01			
1994	190	0400	545.2	517.6	27.6							510				0.0241	0.19	0.18	0.01			
1994	190	0800	555.2	543.0	12.2							530				0.0241	0.19	0.19	0.00			
1994	190	1000									15					0.0102	0.00	0.00	0.00			
1994	190	2000	558.2	546.0	12.2							580				0.0118	0.27	0.26	0.01			
1994	191	0800	569.8	541.0	28.8							592				0.0118	0.29	0.28	0.01			
1994	191	2000	522.9	499.2	23.7							625				0.0118	0.27	0.25	0.01			
1994	192	0800	580.6	474.0	106.6							635				0.0118	0.30	0.24	0.05			
1994	192	0930									12					0.0134	0.00	0.00	0.00			
1994	192	1400								7.7		620				0.0150	0.00	0.00	0.00			
1994	192	2000	523.9	495.4	28.5							549				0.0150	0.34	0.32	0.02			
1994	193	0800	525.4	500.9	24.5							599				0.0150	0.34	0.32	0.02			
1994	193	2000	538.2	504.1	34.1							605				0.0150	0.35	0.33	0.02			
1994	194	0800	531.0	495.2	35.8							571				0.0150	0.34	0.32	0.02			
1994	194	0900									12					0.0166	0.00	0.00	0.00			

Appendix E3

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1994	194	2000	503.4	464.6	38.8											0.0118	0.31	0.28	0.02			
1994	195	0800	528.2	452.8	75.4											0.0118	0.27	0.23	0.04			
1994	195	2000	522.5	508.2	14.3											0.0118	0.27	0.26	0.01			
1994	196	0800	543.8	466.2	77.6											0.0118	0.28	0.24	0.04			
1994	196	2000	549.4	496.2	53.2											0.0118	0.28	0.25	0.03			
1994	197	0800	591.4	536.6	54.8											0.0118	0.30	0.27	0.03			
1994	197	2000	615.0	558.8	56.2											0.0118	0.31	0.28	0.03			
1994	198	0800	663.2	578.0	85.2											0.0118	0.34	0.29	0.04			
1994	198	2000	656.2	580.8	75.4											0.0118	0.33	0.30	0.04			
1994	199	0800	676.8	630.6	46.2											0.0118	0.35	0.32	0.02			
1994	199	0930														0.0069	0.00	0.00	0.00			
1994	199	2000	667.4	620.4	47.0											0.0035	0.15	0.14	0.01			
1994	200	0800	701.0	650.3	50.6							594				0.0035	0.11	0.10	0.01			
1994	200	2000	824.7	713.6	111.1							605				0.0035	0.12	0.11	0.02			
1994	201	0800	959.0	844.4	114.6							702				0.0000						
1994	201	0830																				
1995	75	1400	334.0	233.6	100.4											0.0001	0.00	0.00	0.00	0.00	0.00	0.00
1995	76	0940														0.0000	0.00	0.00	0.00	0.00	0.00	0.00
1995	76	1600	359.3	246.3	113.0					7.4		905				0.0020	0.02	0.01	0.01	0.00	0.00	0.00
1995	77	1100														0.0000	0.00	0.00	0.00	0.00	0.00	0.00
1995	77	1730															0.00	0.00	0.00	0.00	0.00	0.00
1995	78	1730															0.00	0.00	0.00	0.00	0.00	0.00
1995	79																0.00	0.00	0.00	0.00	0.00	0.00
1995	80	1000														0.0000	0.00	0.00	0.00	0.00	0.00	0.00
1995	80	1345	821.9	755.4	66.5		3450.3	19.3								0.0008	0.01	0.01	0.00	0.00	0.24	0.00
1995	80	1445	809.1	737.7	71.4		5253.2	73.0								0.0147	0.04	0.04	0.00	0.00	0.28	0.00
1995	80	1730	757.2	665.1	92.1		6520.1	91.0						42.7	0.13	0.0286	0.20	0.18	0.02	0.00	1.72	0.02
1995	80	1900	730.2	650.1	80.1		5030.8	72.1								0.0286	0.13	0.11	0.01	0.00	0.86	0.01
1995	81	1000	789.6	739.8	49.8		5545.8	40.1								0.0376	1.60	1.50	0.10	0.00	11.26	0.08
1995	81	1140	786.1	733.0	53.1		7018.9	19.3								0.0177	0.08	0.08	0.01	0.00	0.75	0.00
1995	81	1516	727.3	649.8	77.5		8975.9	40.1								0.0121	0.11	0.10	0.01	0.00	1.40	0.01
1995	81	1516	763.8	723.9	39.9												0.00	0.00	0.00	0.00	0.00	0.00
1995	81	1553	688.5	574.5	114.0		9509.8	44.8								0.0121	0.02	0.02	0.00	0.00	0.25	0.00
1995	81	1553	675.6	597.1	78.5												0.00	0.00	0.00	0.00	0.00	0.00
1995	82	1400	750.9	696.0	54.9											0.0022	0.13	0.12	0.01	0.00	0.00	0.00
1995	82	1600	734.7	668.1	66.6											0.0022	0.01	0.01	0.00	0.00	0.00	0.00

Appendix E3

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1995	82	1800	672.3	563.7	108.6											0.0022	0.01	0.01	0.00	0.00	0.00	0.00
1995	82	1830	745.5	657.3	88.2											0.0022	0.00	0.00	0.00	0.00	0.00	0.00
1995	83	1200	631.4	573.2	58.2											0.0022	0.09	0.08	0.01	0.00	0.00	0.00
1995	83	1400	637.8	580.5	57.3											0.0014	0.01	0.01	0.00	0.00	0.00	0.00
1995	83	1415	681.1	589.0	92.1	524.0										0.0014	0.00	0.00	0.00	1.70	0.00	0.00
1995	83	1600	621.9	575.4	46.5											0.0007	0.00	0.00	0.00	0.00	0.00	0.00
1995	83	1800	645.0	600.6	44.4											0.0000	0.00	0.00	0.00	0.00	0.00	0.00
1995	84	1420														0.0000	0.00	0.00	0.00	0.00	0.00	0.00
1995	85	1430														0.0000	0.00	0.00	0.00	0.00	0.00	0.00
1995	86	1415														0.0000	0.00	0.00	0.00	0.00	0.00	0.00
1995	87	1410														0.0000	0.00	0.00	0.00	0.00	0.00	0.00
1995	88	1406	530.0	511.0	19.0											0.0032	0.15	0.14	0.01	0.00	0.00	0.00
1995	89	1030	523.3	479.3	44.1											0.0008	0.00	0.00	0.00	0.00	0.00	0.00
1995	89	1200	523.3	479.3	44.1											0.0008	0.00	0.00	0.00	0.00	0.00	0.00
1995	89	1400	516.6	447.5	69.1											0.0008	0.04	0.03	0.00	0.00	0.00	0.00
1995	89	1400	520.2	461.3	58.9											0.0008	0.00	0.00	0.00	0.00	0.00	0.00
1995	89	1600	525.2	471.4	53.8											0.0008	0.00	0.00	0.00	0.00	0.00	0.00
1995	89	1800	530.8	477.8	53.0											0.0014	0.01	0.00	0.00	0.00	0.00	0.00
1995	90	1200	480.0	439.8	40.2											0.0014	0.04	0.04	0.00	0.00	0.00	0.00
1995	90	1400	479.2	429.0	50.2											0.0022	0.01	0.01	0.00	0.00	0.00	0.00
1995	90	1600	519.4	464.2	55.2											0.0022	0.01	0.01	0.00	0.00	0.00	0.00
1995	90	1650	530.1	457.0	73.1	401.6										0.0022	0.00	0.00	0.00	0.20	0.00	0.00
1995	90	1800	502.2	464.8	37.4											0.0014	0.00	0.00	0.00	0.00	0.00	0.00
1995	91	1200	465.6	416.2	49.4	353.8										0.0014	0.04	0.04	0.00	0.03	0.00	0.00
1995	91	1400	557.4	410.4	147.0											0.0014	0.01	0.00	0.00	0.00	0.00	0.00
1995	91	1600	454.8	417.6	37.2											0.0014	0.00	0.00	0.00	0.00	0.00	0.00
1995	91	1800	467.8	417.6	50.2											0.0014	0.00	0.00	0.00	0.00	0.00	0.00
1995	91	2000	476.4	429.8	46.6											0.0014	0.00	0.00	0.00	0.00	0.00	0.00
1995	92	1000	412.6	384.6	28.0											0.0014	0.03	0.03	0.00	0.00	0.00	0.00
1995	92	1200	403.2	376.0	27.2											0.0014	0.00	0.00	0.00	0.00	0.00	0.00
1995	92	1400	413.1	378.7	34.4					7.7		449				0.0014	0.00	0.00	0.00	0.00	0.00	0.00
1995	92	1400	411.4	380.5	30.9											0.0014	0.00	0.00	0.00	0.00	0.00	0.00
1995	92	1600	428.2	395.2	33.0											0.0008	0.00	0.00	0.00	0.00	0.00	0.00
1995	93	1111	402.8	374.4	28.4		6089.6	22.8						42.35	0.02	0.0008	0.02	0.02	0.00	0.00	6.93	0.03
1995	94	1350	361.5	336.8	24.7											0.0004	0.01	0.01	0.00	0.00	0.00	0.00
1995	95	1405	343.5	324.6	18.9											0.0003	0.00	0.00	0.00	0.00	0.00	0.00
1995	96	1430	343.5	324.6	18.9											0.0005	0.00	0.00	0.00	0.00	0.00	0.00

Appendix E3

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1995	97	1345	325.5	312.4	13.1											0.0004	0.03	0.03	0.00	0.00	0.00	0.00
1995	98	1200	351.7	335.8	15.9											0.0000	0.00	0.00	0.00	0.00	0.00	0.00
1995	99	1200	351.7	335.8	15.9											0.0000	0.00	0.00	0.00	0.00	0.00	0.00
1995	100	1400	377.9	359.5	18.4	313.7			97.0	6.7		495				0.0022	0.11	0.11	0.01	0.20	0.00	0.00
1995	101	1000	360.9	320.2	40.7											0.0022	0.06	0.05	0.01	0.00	0.00	0.00
1995	101	1200	368.0	334.0	34.0											0.0022	0.01	0.01	0.00	0.00	0.00	0.00
1995	101	1415	332.9	300.7	32.2		6016.1	23.8								0.0022	0.06	0.06	0.01	0.00	4.82	0.02
1995	101	1400	360.9	322.7	38.2											0.0022	0.01	0.01	0.00	0.00	0.00	0.00
1995	101	1600	347.1	303.4	43.7											0.0022	0.01	0.01	0.00	0.00	0.00	0.00
1995	101	1800	351.0	306.6	44.4											0.0022	0.01	0.01	0.00	0.00	0.00	0.00
1995	102	1000	343.9	309.1	34.8											0.0022	0.05	0.05	0.01	0.00	0.00	0.00
1995	102	1200	357.4	319.0	38.4											0.0022	0.06	0.05	0.01	0.00	0.00	0.00
1995	102	1400	322.6	276.8	45.8											0.0022	0.05	0.04	0.01	0.00	0.00	0.00
1995	102	1400	333.9	296.0	37.9											0.0014	0.01	0.01	0.00	0.00	0.00	0.00
1995	102	1600	341.4	303.8	37.6											0.0014	0.01	0.01	0.00	0.00	0.00	0.00
1995	103	1010	299.2	266.5	32.6											0.0014	0.03	0.03	0.00	0.00	0.00	0.00
1995	103	1200	295.1	267.6	27.5											0.0014	0.00	0.00	0.00	0.00	0.00	0.00
1995	103	1310	295.1	267.6	27.5											0.0014	0.00	0.00	0.00	0.00	0.00	0.00
1995	103	1400	291.0	268.7	22.3											0.0014	0.07	0.06	0.01	0.00	0.00	0.00
1995	103	1445	288.2	260.1	28.0											0.0014	0.00	0.00	0.00	0.00	0.00	0.00
1995	103	1600	309.5	284.6	24.9											0.0014	0.00	0.00	0.00	0.00	0.00	0.00
1995	103	1800	318.5	284.9	33.6											0.0022	0.01	0.01	0.00	0.00	0.00	0.00
1995	104	1000	494.0	427.1	66.9											0.0022	0.08	0.07	0.01	0.00	0.00	0.00
1995	104	1200	502.1	433.8	68.3											0.0022	0.08	0.07	0.01	0.00	0.00	0.00
1995	104	1400	478.1	412.6	65.5											0.0022	0.08	0.07	0.01	0.00	0.00	0.00
1995	104	1600	462.5	401.7	60.9											0.0022	0.02	0.02	0.00	0.00	0.00	0.00
1995	104	1800	454.0	386.4	67.6											0.0032	0.03	0.03	0.00	0.00	0.00	0.00
1995	105	1000	382.5	325.6	56.9											0.0032	0.09	0.07	0.01	0.00	0.00	0.00
1995	105	1200	376.5	327.0	49.5											0.0032	0.09	0.08	0.01	0.00	0.00	0.00
1995	105	1400	352.5	312.1	40.4											0.0032	0.08	0.07	0.01	0.00	0.00	0.00
1995	105	1600	351.8	308.3	43.5											0.0022	0.02	0.01	0.00	0.00	0.00	0.00
1995	105	1800	327.0	286.3	40.7											0.0022	0.02	0.01	0.00	0.00	0.00	0.00
1995	106	1000	288.8	262.3	26.5											0.0022	0.05	0.04	0.00	0.00	0.00	0.00
1995	106	1200	294.5	254.8	39.7											0.0014	0.03	0.03	0.00	0.00	0.00	0.00
1995	106	1400	288.4	258.4	30.0											0.0014	0.03	0.03	0.00	0.00	0.00	0.00
1995	106	1440	283.8	254.8	29.0		3013.6	18.2				510		54.55	0.06	0.0022	0.01	0.01	0.00	0.00	8.35	0.05
1995	106	1600	282.4	247.1	35.4											0.0014	0.01	0.00	0.00	0.00	0.00	0.00

Appendix E3

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1995	106	1800	288.1	258.0	30.1											0.0008	0.00	0.00	0.00	0.00	0.00	0.00
1995	107	1000	258.0	231.5	26.5											0.0008	0.01	0.01	0.00	0.00	0.00	0.00
1995	107	1200	259.8	235.4	24.4											0.0008	0.01	0.01	0.00	0.00	0.00	0.00
1995	107	1400	272.9	241.0	31.9											0.0008	0.02	0.01	0.00	0.00	0.00	0.00
1995	107	1525	252.0	231.1	20.9	197.9			108.9	7.5						0.0008	0.00	0.00	0.00	0.66	0.00	0.00
1995	107	1600	255.3	232.1	23.1											0.0008	0.00	0.00	0.00	0.00	0.00	0.00
1995	107	1800	249.3	230.0	19.3											0.0008	0.00	0.00	0.00	0.00	0.00	0.00
1995	108	1000	245.8	222.0	23.8											0.0008	0.01	0.01	0.00	0.00	0.00	0.00
1995	108	1200	247.2	226.9	20.3											0.0008	0.01	0.01	0.00	0.00	0.00	0.00
1995	108	1400	245.5	218.5	27.0											0.0008	0.01	0.01	0.00	0.00	0.00	0.00
1995	108	1445	246.5	215.0	31.6											0.0008	0.00	0.00	0.00	0.00	0.00	0.00
1995	108	1600	249.7	226.2	23.5											0.0006	0.00	0.00	0.00	0.00	0.00	0.00
1995	108	1800	243.0	222.3	20.7											0.0006	0.00	0.00	0.00	0.00	0.00	0.00
1995	109	1550	226.9	207.6	19.3											0.0006	0.01	0.01	0.00	0.00	0.00	0.00
1995	110	1630	224.2	194.7	29.5											0.0004	0.02	0.01	0.00	0.00	0.00	0.00
1995	111	1345	220.4	195.8	24.6											0.0004	0.02	0.02	0.00	0.00	0.00	0.00
1995	112	0000														0.0000	0.00	0.00	0.00	0.09	1.98	0.01
1995	113	1440														0.0000						
1995	114	1450														0.0000						
1995	167	2040	338.8	171.0	167.8	141.5	57.4	84.8				183	7.26	15.65	1.1	0.0000	0.00	0.00	0.00	0.00	0.00	0.00
1995	168	0000	312.0	129.5	182.5	81.6										0.0000	0.00	0.00	0.00	0.00	0.00	0.00
1995	168	0400	969.0	380.1	589.0	379.7											1.16	0.46	0.71	0.46	0.00	0.00
1995	168	0640	855.0	346.1	509.0	334.0		84.2				330	34.29	37.6	0.9	0.1383	1.31	0.53	0.78	0.51	0.00	0.00
1995	163	0800	655.5	339.0	316.5	334.5											0.38	0.20	0.18	0.19	0.00	0.00
1995	168	0815	634.2	371.1	263.1	352.0	1790.3	52.4				394	54.96	42.45	0.52	0.1299	0.07	0.04	0.03	0.04	12.11	0.35
1995	168	0930	561.0	362.2	198.8	347.0	1838.8	53.4				424	63.3	46	1.25	0.1065	0.29	0.19	0.10	0.18	0.96	0.03
1995	168	1000	553.5	362.0	191.5	355.2											0.10	0.07	0.04	0.07	0.00	0.00
1995	168	1035	544.5	374.5	170.0	368.4	1881.4	42.6				418	65.95	47.95	0.6	0.0993	0.10	0.07	0.03	0.06	0.68	0.02
1995	168	1200	529.4	325.9	203.5	314.2											0.28	0.17	0.11	0.17	0.00	0.00
1995	168	1222	507.0	351.5	155.5	328.8	1879.8	42.8	85.4	7.4		437	67.65	47.6	0.5	0.0993	0.09	0.06	0.03	0.06	1.32	0.03
1995	168	1400	485.5	329.4	156.2	305.3											0.26	0.17	0.08	0.16	0.00	0.00
1995	168	1600	1333.5	292.5	1041.0	262.3											1.00	0.22	0.78	0.20	0.00	0.00
1995	168	1600	596.2	287.7	308.6	266.2	2367.3	34.0	67.5	7.6		327	41.67	35.6	0.52	0.1852	0.00	0.00	0.00	0.00	3.02	0.04
1995	168	1700	694.7	274.1	420.6											0.5347	0.00	0.00	0.00	0.00	0.00	0.00
1995	168	1730	793.2	260.4	532.8	247.6	2528.9	62.5				258	31.9	28.45	0.78	1.9264	2.09	0.68	1.40	0.65	6.65	0.16
1995	168	1852	779.0	331.0	448.0	316.0					10					2.0842	7.99	3.39	4.59	3.24	0.00	0.00
1995	168	2140	318.5	302.0	16.5	321.5	1810.0	54.4				252	27.95	28.3	0.95	0.3047	0.98	0.93	0.05	0.99	24.12	0.72

Appendix E3

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1995	168	2330	518.5	366.0	152.5	314.0	1836.3	63.9				262	32.2	27.5	0.79	0.2063	0.29	0.20	0.08	0.17	1.02	0.04
1995	169	0000	545.6	350.7	194.9												0.19	0.12	0.07	0.00	0.00	0.00
1995	169	0200	490.5	338.6	152.0												0.60	0.42	0.19	0.00	0.00	0.00
1995	169	0400	479.4	324.3	155.1												0.50	0.34	0.16	0.00	0.00	0.00
1995	169	0600	416.7	306.6	110.1												0.42	0.31	0.11	0.00	0.00	0.00
1995	169	0800	416.7	314.4	102.3												0.42	0.32	0.10	0.00	0.00	0.00
1995	169	0950	377.5	294.5	83.0	256.9	1104.0	34.6				330	45.8	39.35	0.75	0.0993	0.28	0.22	0.06	1.38	5.92	0.19
1995	169	1000	391.6	284.1	107.5												0.03	0.02	0.01	0.00	0.00	0.00
1995	169	1100	379.2	294.7	84.5	249.7	1143.3	32.8				330	47.05	39.15	0.7	0.0924	0.09	0.07	0.02	0.08	0.37	0.01
1995	169	1200	371.4	269.2	102.2												0.13	0.10	0.04	0.00	0.00	0.00
1995	169	1400	348.9	274.5	74.4												0.19	0.15	0.04	0.00	0.00	0.00
1995	169	1530	353.1	302.3	50.8	254.9	938.3	33.3		7.4		393	49.6	38	0.72	0.0678	0.10	0.09	0.02	0.31	1.13	0.04
1995	169	1600	329.7	262.8	66.9												0.05	0.04	0.01	0.00	0.00	0.00
1995	169	1800	329.7	268.2	61.5												0.13	0.11	0.02	0.00	0.00	0.00
1995	169	2000	310.8	264.9	45.9												0.12	0.10	0.02	0.00	0.00	0.00
1995	169	2045	336.6	292.5	44.1	247.3	588.6	29.4				468	58.3	48.55	0.56	0.0623	0.05	0.04	0.01	0.27	0.64	0.03
1995	169	2200	312.9	264.9	48.0												0.08	0.07	0.01	0.00	0.00	0.00
1995	170	0000	308.7	269.1	39.6												0.12	0.11	0.02	0.00	0.00	0.00
1995	170	0200	306.3	270.3	36.0												0.13	0.11	0.02	0.00	0.00	0.00
1995	170	0400	303.3	268.2	35.1												0.13	0.11	0.01	0.00	0.00	0.00
1995	170	0600	303.3	269.1	34.2												0.13	0.11	0.01	0.00	0.00	0.00
1995	170	0800	282.9	259.5	23.4												0.12	0.11	0.01	0.00	0.00	0.00
1995	170	0900	282.3	258.3	24.0	229.8	253.0	14.8				439	77.1	55.1	0.32	0.0390	0.05	0.05	0.00	0.57	0.63	0.04
1995	170	1000	281.0	252.6	28.4												0.04	0.03	0.00	0.00	0.00	0.00
1995	170	1200	276.0	261.0	15.0												0.07	0.07	0.00	0.00	0.00	0.00
1995	170	1300	280.2	260.7	19.5											0.0166	0.00	0.00	0.00	0.00	0.00	0.00
1995	170	1400	284.4	260.4	24.0												0.05	0.05	0.00	0.00	0.00	0.00
1995	170	1600	280.2	266.0	14.2												0.03	0.03	0.00	0.00	0.00	0.00
1995	170	1800	278.8	261.0	17.8												0.03	0.03	0.00	0.00	0.00	0.00
1995	170	2000	277.4	258.4	19.0	228.9	179.6	22.7				490	102.7	52.45	0.24	0.0121	0.03	0.03	0.00	0.20	0.16	0.02
1995	170	2200	280.2	260.4	19.8												0.03	0.02	0.00	0.00	0.00	0.00
1995	171	0000	277.4	266.0	11.4												0.03	0.03	0.00	0.00	0.00	0.00
1995	171	0200	283.4	259.3	24.1												0.05	0.05	0.00	0.00	0.00	0.00
1995	171	0400	289.5	251.4	38.1												0.06	0.05	0.01	0.00	0.00	0.00
1995	171	0600	282.0	243.2	38.8												0.06	0.05	0.01	0.00	0.00	0.00
1995	171	0800	268.0	243.2	24.8												0.05	0.05	0.00	0.00	0.00	0.00
1995	171	0950	260.4	241.7	18.7	202.8	327.7	20.0		7.5		520	81.4	55.9	0.31	0.0218	0.04	0.04	0.00	0.23	0.37	0.02

Appendix E3

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1995	171	1000	256.9	233.3	23.6												0.00	0.00	0.00	0.00	0.00	0.00
1995	171	1200	258.8	241.0	17.8												0.04	0.04	0.00	0.00	0.00	0.00
1995	171	1400	262.8	237.3	25.5												0.04	0.03	0.00	0.00	0.00	0.00
1995	171	1600	264.9	249.7	15.2												0.04	0.04	0.00	0.00	0.00	0.00
1995	171	1800	272.6	244.6	28.0												0.04	0.03	0.00	0.00	0.00	0.00
1995	171	2000	248.2	229.1	19.1	187.7	176.8	23.7	112.5	7.5	13	520	96	65.3	0.21	0.0166	0.03	0.02	0.00	0.13	0.12	0.02
1995	171	2000	252.2	233.7	18.5												0.00	0.00	0.00	0.00	0.00	0.00
1995	171	2200	254.8	239.9	14.9												0.03	0.03	0.00	0.00	0.00	0.00
1995	172	0000	255.9	233.7	22.2												0.03	0.03	0.00	0.00	0.00	0.00
1995	172	0200	242.4	228.6	13.8												0.03	0.03	0.00	0.00	0.00	0.00
1995	172	0400	262.4	240.6	21.8												0.03	0.03	0.00	0.00	0.00	0.00
1995	172	0600	243.9	228.3	15.6												0.03	0.03	0.00	0.00	0.00	0.00
1995	172	0800	258.8	243.5	15.3												0.03	0.03	0.00	0.00	0.00	0.00
1995	172	0930	234.8	219.9	14.9	192.1	110.1	20.7			11	541	106.7	63.3	0.16	0.0102	0.02	0.02	0.00	0.16	0.09	0.02
1995	172	1000	237.5	226.9	10.6												0.01	0.01	0.00	0.00	0.00	0.00
1995	172	1200	234.2	225.1	9.1												0.02	0.02	0.00	0.00	0.00	0.00
1995	172	1400	236.4	229.8	6.6												0.02	0.02	0.00	0.00	0.00	0.00
1995	172	1600	238.2	225.8	12.4												0.02	0.01	0.00	0.00	0.00	0.00
1995	172	1800	234.9	217.8	17.1												0.01	0.01	0.00	0.00	0.00	0.00
1995	172	2000	234.0	234.0	0.0	182.9	81.8	17.2								0.0070	0.01	0.01	0.00	0.07	0.03	0.01
1995	172	2000	233.5	215.3	18.2												0.00	0.00	0.00	0.00	0.00	0.00
1995	172	2200	231.3	222.6	8.7												0.01	0.01	0.00	0.00	0.00	0.00
1995	173	0000	234.2	223.7	10.5												0.02	0.01	0.00	0.00	0.00	0.00
1995	173	0200	237.8	226.6	11.2												0.02	0.01	0.00	0.00	0.00	0.00
1995	173	0400	232.0	222.6	9.4												0.01	0.01	0.00	0.00	0.00	0.00
1995	173	0600	229.1	216.0	13.1												0.01	0.01	0.00	0.00	0.00	0.00
1995	173	0800	225.5	217.8	7.7												0.01	0.01	0.00	0.00	0.00	0.00
1995	173	1000	229.5	222.2	7.3												0.01	0.01	0.00	0.00	0.00	0.00
1995	173	1120	219.8	219.2	0.6	183.6	53.4	25.5					119.3	102.3	0.15	0.0044	0.01	0.01	0.00	0.09	0.03	0.01
1995	173	1200	222.6	214.6	8.0												0.00	0.00	0.00	0.00	0.00	0.00
1995	173	1600	219.7	212.8	6.9												0.02	0.02	0.00	0.00	0.00	0.00
1995	173	2000	231.7	222.9	8.8												0.02	0.02	0.00	0.00	0.00	0.00
1995	174	0000	230.6	227.7	2.9												0.02	0.02	0.00	0.00	0.00	0.00
1995	174	0400	235.6	230.6	5.0												0.02	0.02	0.00	0.00	0.00	0.00
1995	174	0800	241.5	215.3	26.2												0.02	0.02	0.00	0.00	0.00	0.00
1995	174	1200	229.1	224.0	5.1												0.02	0.02	0.00	0.00	0.00	0.00
1995	174	1300	237.8	235.3	2.5	189.4	29.0	29.6								0.0026	0.00	0.00	0.00	0.11	0.02	0.02

Appendix E3

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1995	174	1600	240.7	221.3	19.4												0.01	0.01	0.00	0.00	0.00	0.00
1995	174	2000	243.3	234.3	9.0												0.02	0.02	0.00	0.00	0.00	0.00
1995	175	0000	246.5	237.9	8.6												0.02	0.02	0.00	0.00	0.00	0.00
1995	175	0400	253.4	240.7	4.7												0.02	0.02	0.00	0.00	0.00	0.00
1995	175	0800	262.0	228.9	33.1												0.02	0.02	0.00	0.00	0.00	0.00
1995	175	1200	257.7	239.7	18.0												0.02	0.02	0.00	0.00	0.00	0.00
1995	175	1500	254.0	242.4	11.6	202.7	28.9	27.9								0.0008	0.01	0.01	0.00	0.10	0.01	0.01
1995	175	1600	255.9	241.5	14.4												0.00	0.00	0.00	0.00	0.00	0.00
1995	175	2000	255.9	240.7	15.2												0.00	0.00	0.00	0.00	0.00	0.00
1995	176	0000	269.2	242.6	26.6												0.00	0.00	0.00	0.00	0.00	0.00
1995	176	0400	251.6	234.3	17.3												0.01	0.01	0.00	0.00	0.00	0.00
1995	176	0800	258.0	244.4	13.6												0.01	0.01	0.00	0.00	0.00	0.00
1995	176	1200	254.8	254.8	0.0												0.00	0.00	0.00	0.00	0.00	0.00
1995	176	1500	254.5	254.2	0.3	206.6	8.1	26.3			20					0.0013	0.00	0.00	0.00	0.02	0.00	0.00
1995	177	1500	272.2	238.2	34.0	193.3	23.4	34.2				400				0.0280	6.06	5.30	0.76	4.30	0.52	0.76
1995	177	1600	265.0	233.0	32.0	193.9	21.9	29.0				400				0.0248	0.19	0.16	0.02	0.14	0.02	0.02
1995	178	1000	236.4	210.9	25.5	170.7	20.8	32.6	113.6	7.3		484				0.0121	0.53	0.47	0.06	0.38	0.05	0.07
1995	178	1200	248.2	229.6	18.6												0.04	0.04	0.00	0.00	0.00	0.00
1995	178	1600	251.9	240.2	11.7												0.08	0.07	0.00	0.00	0.00	0.00
1995	178	2000	252.2	235.1	17.1												0.05	0.05	0.00	0.00	0.00	0.00
1995	179	0000	242.8	234.0	8.8												0.06	0.05	0.00	0.00	0.00	0.00
1995	179	0400	249.3	228.2	21.1												0.06	0.05	0.01	0.00	0.00	0.00
1995	179	0800	249.0	219.1	29.9												0.06	0.05	0.01	0.00	0.00	0.00
1995	179	1200	259.2	219.1	40.1												0.06	0.05	0.01	0.00	0.00	0.00
1995	179	1430	253.4	244.0	9.4											0.0034	0.03	0.03	0.00	0.00	0.00	0.00
1995	179	1600	237.2	224.2	13.0											0.0034	0.00	0.00	0.00	0.00	0.00	0.00
1995	179	2000	243.0	229.3	13.8											0.0026	0.01	0.01	0.00	0.00	0.00	0.00
1995	180	000	245.2	224.9	20.3											0.0026	0.01	0.01	0.00	0.00	0.00	0.00
1995	180	0400	252.8	156.9	96.0											0.0018	0.01	0.00	0.00	0.00	0.00	0.00
1995	180	0800	251.0	241.9	9.1											0.0018	0.01	0.01	0.00	0.00	0.00	0.00
1995	180	1200	248.8	247.7	1.1											0.0013	0.00	0.00	0.00	0.00	0.00	0.00
1995	180	1400	246.8	238.7	8.1					7.5						0.0013	0.00	0.00	0.00	0.00	0.00	0.00
1995	181	1430	283.2	259.7	23.5											0.0010	0.03	0.02	0.00	0.35	9.77	1.37
1995	182	1200	283.6	259.3	24.3												0.03	0.02	0.00	0.00	0.00	0.00
1995	182	1500	313.6	271.3	42.3		9.5	21.6					102	70.3	0.21	0.0008	0.00	0.00	0.00	0.00	0.26	0.06
1995	183	1200	286.9	273.7	13.2												0.00	0.00	0.00	0.00	0.00	0.00
1995	183	1520	295.1	283.3	11.8											0.0005	0.02	0.02	0.00	0.00	0.00	0.00

Appendix E3

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1995	184		326.4	307.5	18.9												0.00	0.00	0.00	0.00	0.00	0.00
1995	185	1130	357.7	331.6	26.1	289.0	10.1	20.4	139.5	7.2(7.9)		477				0.0005	0.03	0.03	0.00	0.08	0.51	0.06
1995	186	1000	344.9	337.7	7.2						12		96.9	78.8	0.22	0.0008	0.01	0.01	0.00	0.00	0.00	0.00
1995	186	1200	328.4	317.7	10.7												0.00	0.00	0.00	0.00	0.00	0.00
1995	187	1430	336.3	332.7	3.6					7.1		603				0.0002	0.00	0.00	0.00	0.00	0.00	0.00
1995	187	1200	342.4	332.3	10.1												0.02	0.02	0.00	0.00	0.00	0.00
1995	188	1130	349.6	334.2	15.4											0.0002	0.01	0.01	0.00	0.00	0.00	0.00
1995	188	1200	343.5	337.4	6.1												0.00	0.00	0.00	0.00	0.00	0.00
1995	189	1200	358.8	340.3	18.5												0.01	0.01	0.00	0.00	0.00	0.00
1995	190	1200	379.9	352.8	27.1												0.00	0.00	0.00	0.00	0.00	0.00
1995	191																0.00	0.00	0.00	0.00	0.00	0.00
1995	192	1030	411.4	393.5	17.9		19.7	39.8				615					0.01	0.01	0.00	0.00	0.00	0.01
1995	220	0850																				
1995	220	1000	426.5	340.5	86.0	301.5	236.9	5.5				507	52.05	65.2	0.33	0.0248	0.02	0.01	0.00	0.01	0.01	0.00
1995	220	1200	550.0	278.0	272.0												0.40	0.20	0.20	0.00	0.00	0.00
1995	220	1400	384.5	267.0	117.5												0.53	0.37	0.16	0.00	0.00	0.00
1995	220	1515	375.0	246.5	128.5	210.5	65.6	34.0				244	15.35	27.1	0.84	0.2651	0.37	0.24	0.13	0.65	0.20	0.10
1995	220	1600	437.5	285.0	152.5												0.28	0.18	0.10	0.00	0.00	0.00
1995	220	1800	353.0	230.0	123.0												0.60	0.39	0.21	0.00	0.00	0.00
1995	220	1930	346.0	239.0	107.0	201.5	72.2	26.6				251	24.2	28.8	0.84		0.44	0.30	0.14	0.72	0.26	0.10
1995	220	2000	362.5	230.0	132.5												0.15	0.10	0.06	0.00	0.00	0.00
1995	220	2200	373.5	252.0	121.5												0.63	0.43	0.21	0.00	0.00	0.00
1995	221	0000	351.5	250.0	101.5												0.59	0.42	0.17	0.00	0.00	0.00
1995	221	0200	333.0	254.0	79.0												0.56	0.43	0.13	0.00	0.00	0.00
1995	221	0400	336.5	257.5	79.0												0.57	0.43	0.13	0.00	0.00	0.00
1995	221	0600	307.0	228.0	79.0												0.48	0.36	0.12	0.00	0.00	0.00
1995	221	0800	292.5	217.5	75.0												0.40	0.30	0.10	0.00	0.00	0.00
1995	221	1000	314.5	224.5	90.0	193.0	53.5	23.7				279	27.1	33.9	0.49	0.1470	0.33	0.23	0.09	2.15	0.60	0.26
1995	221	1200	346.5	223.0	123.5												0.43	0.28	0.15	0.00	0.00	0.00
1995	221	1400	303.5	244.5	59.0												0.30	0.24	0.06	0.00	0.00	0.00
1995	221	1530	323.0	235.5	87.5	180.5	35.4	11.4	98.5				29.2	37.3	0.56		0.22	0.16	0.06	0.53	0.10	0.03
1995	221	1600	278.6	224.8	53.8												0.04	0.03	0.01	0.00	0.00	0.00
1995	221	1800	275.6	221.8	53.8												0.17	0.14	0.03	0.00	0.00	0.00
1995	221	2000	264.8	217.6	47.2							287				0.1140	0.16	0.13	0.03	0.00	0.00	0.00
1995	221	2200	259.2	216.0	43.2												0.16	0.13	0.03	0.00	0.00	0.00
1995	222	0000	264.2	218.2	46.0												0.16	0.13	0.03	0.00	0.00	0.00
1995	222	0200	249.8	223.2	26.6												0.15	0.14	0.02	0.00	0.00	0.00

Appendix E3

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1995	222	0400	245.6	208.2	37.4												0.14	0.12	0.02	0.00	0.00	0.00
1995	222	0600	248.4	209.0	39.4												0.13	0.11	0.02	0.00	0.00	0.00
1995	222	0800	242.0	203.2	38.8												0.12	0.10	0.02	0.00	0.00	0.00
1995	222	1000	238.4	204.6	33.8												0.11	0.10	0.02	0.00	0.00	0.00
1995	222	1100	249.5	203.0	46.5	167.5	19.5	36.1				198	35.05	43.5	0.36	0.0571	0.05	0.04	0.01	0.92	0.11	0.20
1995	222	1200	242.7	204.9	37.8												0.04	0.04	0.01	0.00	0.00	0.00
1995	222	1400	240.9	208.2	32.7												0.08	0.07	0.01	0.00	0.00	0.00
1995	222	1540	231.5	214.0	17.5	176.5	20.1	36.9				353	37.35	44.9	0.31	0.0475	0.03	0.03	0.00	0.12	0.01	0.02
1995	222	1600	240.9	207.1	33.8												0.05	0.04	0.01	0.00	0.00	0.00
1995	222	1800	240.2	206.7	33.5												0.08	0.07	0.01	0.00	0.00	0.00
1995	222	2000	230.9	208.5	22.4												0.08	0.07	0.01	0.00	0.00	0.00
1995	222	2200	230.9	211.8	19.1												0.08	0.07	0.01	0.00	0.00	0.00
1995	223	0000	232.2	206.4	25.8												0.08	0.07	0.01	0.00	0.00	0.00
1995	223	0200	226.9	213.2	13.7												0.08	0.07	0.00	0.00	0.00	0.00
1995	223	0400	235.2	203.5	31.7												0.07	0.06	0.01	0.00	0.00	0.00
1995	223	0600	241.3	204.6	36.7												0.07	0.06	0.01	0.00	0.00	0.00
1995	223	0800	233.0	203.1	29.9												0.07	0.06	0.01	0.00	0.00	0.00
1995	223	1000	228.7	204.9	23.8												0.06	0.06	0.01	0.00	0.00	0.00
1995	223	1030	239.0	217.5	21.5	160.5	20.3	28.4				399	44.15	21.1	0.29	0.0280	0.01	0.01	0.00	0.50	0.06	0.09
1995	223	1200	231.8	194.2	37.6												0.04	0.03	0.01	0.00	0.00	0.00
1995	223	1400	222.9	199.5	23.4												0.04	0.04	0.00	0.00	0.00	0.00
1995	223	1600	213.7	195.9	17.8												0.04	0.04	0.00	0.00	0.00	0.00
1995	223	1800	215.8	201.6	14.2												0.04	0.04	0.00	0.00	0.00	0.00
1995	223	2000	215.4	193.5	21.9												0.04	0.04	0.00	0.00	0.00	0.00
1995	223	2200	212.6	198.4	14.2												0.04	0.04	0.00	0.00	0.00	0.00
1995	224	0000	215.8	198.8	17.0												0.04	0.04	0.00	0.00	0.00	0.00
1995	224	0200	220.4	208.0	12.4												0.04	0.04	0.00	0.00	0.00	0.00
1995	224	0400	240.3	215.1	25.2												0.05	0.04	0.01	0.00	0.00	0.00
1995	224	0600	225.4	209.1	16.3												0.05	0.04	0.00	0.00	0.00	0.00
1995	224	0800	224.3	206.9	17.4												0.05	0.04	0.00	0.00	0.00	0.00
1995	224	1000	214.4	202.3	12.1	165.2	21.6	25.4	142.8			410	48.3	57.4	0.26	0.0233	0.04	0.04	0.00	0.39	0.05	0.06
1995	224	1000	208.9	194.8	14.1												0.00	0.00	0.00	0.00	0.00	0.00
1995	224	1200	205.0	197.9	7.1												0.03	0.03	0.00	0.00	0.00	0.00
1995	224	1400	212.1	197.2	14.9												0.03	0.03	0.00	0.00	0.00	0.00
1995	224	1600	211.0	202.2	8.8												0.03	0.03	0.00	0.00	0.00	0.00
1995	224	1800	218.1	199.4	18.7												0.03	0.03	0.00	0.00	0.00	0.00
1995	224	2000	215.3	201.8	13.5												0.03	0.03	0.00	0.00	0.00	0.00

Appendix E3

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1995	224	2200	212.1	201.8	10.3												0.03	0.03	0.00	0.00	0.00	0.00
1995	225	0000	215.3	202.9	12.4												0.03	0.03	0.00	0.00	0.00	0.00
1995	225	0200	217.4	208.9	8.5												0.03	0.03	0.00	0.00	0.00	0.00
1995	225	0400	220.6	208.6	12.0												0.03	0.03	0.00	0.00	0.00	0.00
1995	225	0600	218.1	208.9	9.2												0.03	0.03	0.00	0.00	0.00	0.00
1995	225	0800	229.8	217.8	12.0												0.03	0.03	0.00	0.00	0.00	0.00
1995	225	1000	228.8	208.2	20.6												0.03	0.03	0.00	0.00	0.00	0.00
1995	225	1130	227.1	212.2	14.9	166.6	21.2	40.5		7.4		539	55.1	61.3	0.28	0.0143	0.02	0.02	0.00	0.32	0.04	0.08
1995	225	1200	260.3	236.2	24.1												0.01	0.01	0.00	0.00	0.00	0.00
1995	225	1400	252.9	224.2	28.7												0.02	0.02	0.00	0.00	0.00	0.00
1995	225	1600	277.6	270.2	7.4												0.03	0.03	0.00	0.00	0.00	0.00
1995	225	1800	400.6	287.9	112.7												0.16	0.11	0.04	0.00	0.00	0.00
1995	225	2000	468.6	296.8	171.8												0.31	0.19	0.11	0.00	0.00	0.00
1995	225	2200	383.8	323.0	60.8												0.24	0.20	0.04	0.00	0.00	0.00
1995	226	0000	341.4	291.8	49.6												0.19	0.16	0.03	0.00	0.00	0.00
1995	226	0200	301.3	266.2	35.1												0.18	0.16	0.02	0.00	0.00	0.00
1995	226	0400	281.4	250.9	30.5												0.16	0.15	0.02	0.00	0.00	0.00
1995	226	0600	271.1	241.0	30.1												0.17	0.15	0.02	0.00	0.00	0.00
1995	226	0800	261.9	239.2	22.7												0.15	0.14	0.01	0.00	0.00	0.00
1995	226	1000	250.6	229.6	21.0												0.14	0.13	0.01	0.00	0.00	0.00
1995	226	1015	249.3	229.1	20.2	192.3	13.9	43.5				476	49.46	57.6	0.24	0.0351	0.01	0.01	0.00	1.04	0.08	0.24
1995	226	1200	243.5	223.6	19.9												0.04	0.03	0.00	0.00	0.00	0.00
1995	226	1600	248.1	222.9	25.2												0.08	0.07	0.01	0.00	0.00	0.00
1995	226	2000	248.8	227.9	20.9												0.07	0.06	0.01	0.00	0.00	0.00
1995	227	1020	243.1	232.8	10.3	187.2	18.6	26.1				616	53.1	63.8	0.25	0.0154	0.21	0.20	0.01	0.30	0.03	0.04
1995	227	1200	247.9	223.0	24.9												0.02	0.01	0.00	0.00	0.00	0.00
1995	227	1600	236.9	222.3	14.6												0.02	0.02	0.00	0.00	0.00	0.00
1995	227	2000	240.8	215.9	24.9												0.03	0.02	0.00	0.00	0.00	0.00
1995	228	0000	262.8	224.8	38.0												0.03	0.03	0.00	0.00	0.00	0.00
1995	228	0400	240.1	224.8	15.3												0.03	0.03	0.00	0.00	0.00	0.00
1995	228	0800	234.7	225.8	8.9												0.03	0.03	0.00	0.00	0.00	0.00
1995	228	1100	232.6	228.3	4.3	198.1	27.3	20.4				599	60.45	68.2	0.28	0.0063	0.02	0.02	0.00	0.15	0.02	0.02
1995	228	1200	228.4	216.1	12.3												0.00	0.00	0.00	0.00	0.00	0.00
1995	228	1600	230.8	215.7	15.1												0.01	0.01	0.00	0.00	0.00	0.00
1995	228	2000	226.3	214.6	11.7												0.01	0.01	0.00	0.00	0.00	0.00
1995	229	0000	238.6	224.9	13.7												0.01	0.01	0.00	0.00	0.00	0.00
1995	229	0400	234.0	225.2	8.8												0.01	0.01	0.00	0.00	0.00	0.00

Appendix E3

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1995	229	0800	233.3	225.9	7.4												0.01	0.01	0.00	0.00	0.00	0.00
1995	229	1130	233.0	222.4	10.6	189.5	36.6	30.2	168.0			752	66	73	0.26	0.0026	0.01	0.01	0.00	0.07	0.01	0.01
1995	230	1200	228.0	216.8	11.2												0.06	0.06	0.00	0.00	0.00	0.00
1995	231	1200	226.1	220.1	6.0												0.04	0.04	0.00	0.00	0.00	0.00
1995	231	1430	224.9	214.3	10.6					7.7		713	71.8	75.3	0.28	0.0008	0.00	0.00	0.00	0.00	0.00	0.00
1995	232	1200	230.6	213.5	17.1												0.00	0.00	0.00	0.00	0.00	0.00
1995	233	1150	219.1	218.4	0.7		31.6	31.4				694	69.45			0.0005	0.01	0.01	0.00	0.00	0.02	0.02
1995	233	1200	227.8	224.7	3.1												0.00	0.00	0.00	0.00	0.00	0.00
1995	234	1100	214.9	213.5	1.4	188.6			171.1	7.5		661				0.0005	0.01	0.01	0.00	0.10	0.00	0.00
1995	234	1200	232.7	220.8	11.9												0.00	0.00	0.00	0.00	0.00	0.00
1995	235	1250	241.7	232.4	9.3											0.0002	0.01	0.01	0.00	0.00	0.00	0.00
1995	235	1200	231.0	224.2	6.8												0.00	0.00	0.00	0.00	0.00	0.00
1995	236	1200	236.7	228.2	8.5												0.00	0.00	0.00	0.00	0.00	0.00
1995	237	1130	264.0	261.2	2.8											0.0001	0.00	0.00	0.00	0.00	0.00	0.00
1995	237	1200	254.6	243.9	10.7												0.00	0.00	0.00	0.00	0.00	0.00
1995	238	1200	268.2	256.0	12.2												0.00	0.00	0.00	0.00	0.00	0.00
1995	239	1200	277.1	261.7	15.4												0.00	0.00	0.00	0.00	0.00	0.00
1995	240	1130	314.6	262.8	51.8	226.0	21.7	20.0	170.8			493	52.75	76.3	0.27	0.0005	0.00	0.00	0.00	0.01	0.00	0.00
1995	240	1200	259.5	243.5	16.0												0.00	0.00	0.00	0.00	0.00	0.00
1995	240	2000	261.3	257.0	4.3												0.00	0.00	0.00	0.00	0.00	0.00
1995	241	0950														0.0001	0.00	0.00	0.00	0.00	0.00	0.00
1995	242	1200	277.6	268.4	9.2											0.0000	0.00	0.00	0.00	0.00	0.00	0.00

Appendix E4: Physical and chemical data collected from the agricultural watershed A2, site 1 for 1994 and 1995

1	2	3	4.0	5.0	6.0	7.0	8.0	9.0	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1994	114	1700	803.7	694.2	109.6						7	237				0.0255	3.35	2.90	0.46			
1994	116	1445	720.6	653.2	67.4					7.3	8	262				0.0255	4.48	4.07	0.42			
1994	119	1530	697.4	592.2	105.2					7.6	12	244				0.0219	5.08	4.32	0.77			
1994	123	1155	756.4	714.4	42.0	671.6				7.3	7	259				0.0219	2.64	2.50	0.15			
1994	125	1200	754.4	651.6	102.8					7.7		241				0.0186	2.55	2.20	0.35			
1994	127	1420	754.4	702.3	52.1					7.5	14	248				0.0186	3.66	3.40	0.25			
1994	130	1510	740.7	672.6	68.1					7.9	16	248				0.0186	3.03	2.75	0.28			
1994	133	1520	873.8	662.8	211.0					7.8	15	260				0.0128	2.43	1.85	0.59			
1994	136	1555	706.4	688.2	18.2	643.6				7.7	10	260				0.0128	0.20	0.19	0.01			
1994	136	0850	770.0	675.4	94.6	613.8				7.8	9	310				0.0186	0.40	0.35	0.05			
1994	136	1515	920.4	623.0	297.4	573.4										0.0293	0.59	0.40	0.19			
1994	136	2135	773.2	618.4	154.8	571.2										0.0255	0.85	0.68	0.17			
1994	137	0935	722.8	660.0	62.8	618.4				7.7	8	323				0.0255	0.69	0.63	0.06			
1994	137	2130	673.0	644.8	28.2	594.2				7.7	9	306				0.0186	2.19	2.10	0.09			
1994	139	1435	296.0	281.9	14.1	259.1				7.9	12	283				0.0255	0.84	0.80	0.04			
1994	140	2135	565.6	527.6	38.0	492.4				7.8		287				0.0255	0.90	0.84	0.06			
1994	141	1035	569.6	538.0	31.6	496.4				7.7		326				0.0426	1.01	0.95	0.06			
1994	141	2200	613.0	581.6	31.4	525.8				7.9		320				0.0426	1.73	1.64	0.09			
1994	142	1740	537.0	500.6	36.4	468.0				7.9		291				0.0379	1.55	1.45	0.11			
1994	143	1615	529.4	504.4	25.0	476.8				7.9		286				0.0335	2.78	2.65	0.13			
1994	145	1130	600.4	551.8	48.6	519.4				7.8		284				0.0335	2.96	2.72	0.24			
1994	147	1000	651.0	636.6	14.4	612.8				7.7	14	286				0.0255	4.03	3.94	0.09			
1994	150	1600	722.8	706.2	16.6					7.7	18	280				0.0186	2.79	2.73	0.06			
1994	152	2055	737.4	682.2	55.2							276				0.0219	1.02	0.94	0.08			
1994	153	1150	792.2	751.6	40.6							346				0.0293	0.66	0.63	0.03			
1994	153	2045	754.4	725.8	28.6					7.5		320				0.0255	1.38	1.33	0.05			
1994	154	1455	693.6	670.8	22.8							294				0.0293	1.51	1.46	0.05			
1994	155	1300	651.2	631.2	20.0							254				0.0255	2.50	2.43	0.08			
1994	157	1330	684.2	651.4	32.8					7.7		285				0.0186	2.06	1.96	0.10			
1994	159	1035	773.9	738.4	35.5					7.6		289				0.0186	2.33	2.22	0.11			
1994	161	1140	821.2	784.0	37.2						15	274				0.0155	2.20	2.10	0.10			
1994	163	1550	811.6	771.8	39.8						16	270				0.0128	1.46	1.39	0.07			
1994	164	1005	1226.8	412.0	814.8					7.7		399				0.0426	1.72	0.58	1.14			
1994	164	1640	864.8	804.6	60.2							470				0.0769	7.10	6.61	0.49			
1994	165	1522	775.6	659.0	116.6						10	338				0.1215	1.90	1.62	0.29			
1994	165	2150	695.2	602.2	93.0							322				0.1055	3.42	2.97	0.46			
1994	166	0954	627.6	579.4	48.2							318				0.1134	2.35	2.17	0.18			

Appendix E4

1	2	3	4.0	5.0	6.0	7.0	8.0	9.0	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1994	166	1930	596.6	527.4	69.2						12	311				0.1055	4.47	3.95	0.52			
1994	167	1745	518.4	509.8	8.6						15	287				0.0836	5.02	4.94	0.08			
1994	169	1025	503.8	492.2	11.6						12	300				0.0476	3.86	3.77	0.09			
1994	171	1455	300.5	209.1	91.4						17	285				0.0335	4.12	2.87	1.25			
1994	172	1510														0.0255	0.00	0.00	0.00			
1994	178	1140	834.2	818.2	16.0											0.0128	2.47	2.43	0.05			
1994	179	1515									15					0.0186	0.00	0.00	0.00			
1994	180	1100	827.6	788.2	39.4						13					0.0219	3.19	3.04	0.15			
1994	182	1550	763.2	747.8	15.4											0.0186	3.35	3.28	0.07			
1994	183	0730	1831.6	1415.6	416.0											0.1387	7.32	5.66	1.66			
1994	183	1515	1230.8	956.1	274.7						11					0.1387	18.97	14.74	4.23			
1994	184	1210	623.6	548.0	75.6						14	674				0.2790	5.24	4.61	0.64			
1994	184	2005	856.2	726.8	129.4							329				0.3051	13.65	11.59	2.06			
1994	185	1140	590.2	536.6	53.6							370				0.2665	2.84	2.58	0.26			
1994	185	1650	555.0	534.0	21.0							375				0.2192	6.61	6.36	0.25			
1994	186	1125	547.0	533.2	13.8						13	315				0.1387	13.11	12.78	0.33			
1994	188	1120	587.1	578.4	8.7											0.1387	14.07	13.87	0.21			
1994	190	1125	564.0	490.5	73.5						14	413				0.1387	9.90	8.61	1.29			
1994	192	1140	769.2	745.8	23.5					7.6	14	364				0.0644	8.46	8.21	0.26			
1994	194	1050	787.0	768.6	18.4							350				0.0644	17.39	16.98	0.41			
1994	199	1110	843.2	821.0	22.2						16					0.0379	5.10	4.96	0.13			
1994	201	0955	809.2	808.6	0.6							310				0.0335	3.27	3.27	0.00			
1994	203	1030	969.6	904.2	65.4							313				0.0128	3.21	3.00	0.22			
1994	206	1015	945.6	914.4	31.2							316				0.0128	3.18	3.07	0.10			
1994	209	1130	617.8	522.2	95.6							324				0.0128	2.55	2.15	0.39			
1994	212	1235	585.0	552.8	32.2							307				0.0186	2.06	1.95	0.11			
1994	216	1205	562.2	512.2	50.0											0.0020	0.46	0.42	0.04			
1994	221	0930	840.2	814.2	26.0					7.2		326				0.0020	1.46	1.42	0.05			
1994	227	1520	885.0	819.4	65.6					7.5		315				0.0045						
1995	75	1530	612.4	525.6	86.8											0.0561	6.30	5.41	0.89	0.00	0.00	0.00
1995	76	1040	4026.0	3886.8	139.2											0.0823	22.85	22.06	0.79	0.00	0.00	0.00
1995	76	1700	3969.6	3661.2	308.4					7.5		4408				0.1505	13.62	12.57	1.06	0.00	0.00	0.00
1995	77	1130	5091.6	4572.0	519.6		940.7	16118.1								0.0561	19.02	17.08	1.94	0.00	21.76	372.79
1995	77	1200	5954.4	5091.6	862.8											0.0456	0.49	0.42	0.07	0.00	0.00	0.00
1995	77	1400	4268.4	4185.6	82.8											0.0456	1.40	1.37	0.03	0.00	0.00	0.00
1995	77	1600	4273.2	3913.2	360.0											0.0456	1.40	1.28	0.12	0.00	0.00	0.00

Appendix E4

1	2	3	4.0	5.0	6.0	7.0	8.0	9.0	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1995	77	1800	4754.4	3510.0	1244.4											0.0456	1.56	1.15	0.41	0.00	0.00	0.00
1995	77	1835	5512.8	4970.4	542.4		490.6	19847.7								0.0351	0.41	0.37	0.04	0.00	0.56	22.64
1995	78	1320	3978.0	3835.2	142.8		565.1	12396.9								0.0192	5.15	4.97	0.18	0.00	0.73	16.05
1995	78	1400	3752.8	3531.7	221.0											0.0508	0.46	0.43	0.03	0.00	0.00	0.00
1995	78	1600	4541.6	3466.8	1074.8											0.0508	1.66	1.27	0.39	0.00	0.00	0.00
1995	78	1800	4741.2	4138.8	602.4											0.0508	1.73	1.51	0.22	0.00	0.00	0.00
1995	78	1840	4775.6	4281.5	494.2		586.5	19154.1								0.0823	0.94	0.85	0.10	0.00	0.62	20.11
1995	79	1200	6946.5	6365.7	580.8											0.0508	22.02	20.18	1.84	0.00	0.00	0.00
1995	79	1400	6074.2	5041.3	1032.9											0.0508	2.22	1.84	0.38	0.00	0.00	0.00
1995	79	1530	1364.0	1233.0	131.0		651.9	27521.8						43.7	0.2	0.0192	0.14	0.13	0.01	0.00	2.37	100.16
1995	79	1600	7770.4	6263.4	1507.0											0.0272	0.38	0.31	0.07	0.00	0.00	0.00
1995	79	1800	6485.6	5458.2	1027.4											0.0272	1.27	1.07	0.20	0.00	0.00	0.00
1995	80	1200	7139.0	6074.2	1064.8											0.0272	12.58	10.71	1.88	0.00	0.00	0.00
1995	80	1200	6311.8	5744.2	567.6											0.0272	0.00	0.00	0.00	0.00	0.00	0.00
1995	80	1400	5570.4	4521.0	1049.4											0.0272	1.09	0.89	0.21	0.00	0.00	0.00
1995	80	1438	3973.2	3445.2	528.0		14.3	9931.4								0.0351	0.32	0.28	0.04	0.00	0.03	22.68
1995	80	1600	4765.2	4015.0	750.2											0.0272	0.64	0.54	0.10	0.00	0.00	0.00
1995	80	1800	5830.0	5420.8	409.2											0.0272	1.14	1.06	0.08	0.00	0.00	0.00
1995	80	1848	5096.0	4489.6	606.4		25.6	11181.9								0.0192	0.28	0.25	0.03	0.00	0.01	4.30
1995	81	1130	4859.7	4199.8	659.8		35.0	14827.9								0.0082	2.39	2.07	0.32	0.00	0.02	7.30
1995	81	1400	6507.6	5869.6	638.0											0.0064	0.37	0.34	0.04	0.00	0.00	0.00
1995	81	1600	5878.4	5192.0	686.4											0.0064	0.27	0.24	0.03	0.00	0.00	0.00
1995	81	1624	4836.6	4171.2	665.4		29.4	12811.8								0.0045	0.03	0.03	0.00	0.00	0.00	1.41
1995	81	1800	4922.3	4181.2	741.1	3965.1										0.0023	0.07	0.06	0.01	93.37	0.00	0.00
1995	82															0.0000	0.00	0.00	0.00	0.00	0.00	0.00
1995	83																					
1995	84																					
1995	85																					
1995	86																					
1995	87																					
1995	88															0.0000	0.00	0.00	0.00	0.00	0.00	0.00
1995	89	1515	2181.9	1953.0	228.9											0.0131	2.45	2.19	0.26	0.00	0.00	0.00
1995	90	0935														0.0103	0.00	0.00	0.00	0.00	0.00	0.00
1995	90	1640	2166.5	1740.5	425.9	1694.4										0.0074	1.47	1.18	0.29	4.19	0.00	0.00
1995	91	1340	2099.5	1918.0	181.5	1706.7										0.0060	0.94	0.86	0.08	0.77	0.00	0.00
1995	92	1430	1941.5	1614.8	326.7		58.5	611.1		7.7		520		30.05	0.15	0.0045	0.78	0.65	0.13	0.00	0.20	2.04
1995	93	1205	1851.3	1728.7	122.7											0.0659	9.48	8.86	0.63	0.00	0.00	0.00

Appendix E4

1	2	3	4.0	5.0	6.0	7.0	8.0	9.0	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1995	94	1500	1768.1	739.2	1028.9											0.0045	0.77	0.32	0.45	0.00	0.00	0.00
1995	95	1515	1732.5	1511.7	220.8											0.0351	5.31	4.63	0.68	0.00	0.00	0.00
1995	96	1530	1837.2	1689.4	147.8											0.0120	1.91	1.76	0.15	0.00	0.00	0.00
1995	97	1445	1677.5	1619.2	58.3											0.0062	0.87	0.84	0.03	0.00	0.00	0.00
1995	98															0.0089	0.00	0.00	0.00	0.00	0.00	0.00
1995	99															0.0089	0.00	0.00	0.00	0.00	0.00	0.00
1995	100	1530	2066.9	1786.4	280.5				145.1	7.3		569				0.0115	5.57	4.81	0.76	0.00	0.00	0.00
1995	101	1000	1494.9	1386.0	108.9											0.0118	1.17	1.09	0.09	0.00	0.00	0.00
1995	101	1200	1537.8	1421.2	116.6											0.0118	0.13	0.12	0.01	0.00	0.00	0.00
1995	101	1400	1591.7	1338.7	253.0											0.0118	0.14	0.11	0.02	0.00	0.00	0.00
1995	101	1538	151.1	124.9	26.2		48.8	1241.3								0.0120	0.01	0.01	0.00	0.00	0.73	18.57
1995	101	1600	1508.3	1283.0	225.4											0.0101	0.02	0.02	0.00	0.00	0.00	0.00
1995	101	1800	1412.5	1224.4	188.1											0.0101	0.10	0.09	0.01	0.00	0.00	0.00
1995	102	1000	1320.3	1190.7	129.6											0.0101	0.77	0.69	0.08	0.00	0.00	0.00
1995	102	1200	1371.7	1173.0	198.7											0.0101	0.10	0.09	0.01	0.00	0.00	0.00
1995	102	1400	1382.5	1132.0	250.5											0.0101	0.10	0.08	0.02	0.00	0.00	0.00
1995	102	1450	1414.3	1173.0	241.3											0.0082	0.03	0.03	0.01	0.00	0.00	0.00
1995	102	1600	1318.5	1111.0	207.5											0.0137	0.08	0.06	0.01	0.00	0.00	0.00
1995	103	1000	1306.0	1198.0	108.0											0.0137	1.16	1.06	0.10	0.00	0.00	0.00
1995	103	1200	1267.0	1171.0	96.0											0.0137	0.12	0.12	0.01	0.00	0.00	0.00
1995	103	1400	1352.0	1176.5	175.5											0.0137	0.13	0.12	0.02	0.00	0.00	0.00
1995	103	1430	1432.0	1167.5	264.5											0.0192	0.05	0.04	0.01	0.00	0.00	0.00
1995	103	1600	1628.0	1086.5	541.5											0.0192	0.17	0.11	0.06	0.00	0.00	0.00
1995	103	1800	1357.5	1129.0	228.5											0.0192	0.19	0.16	0.03	0.00	0.00	0.00
1995	104	1000	1578.5	1414.0	164.5											0.0192	1.75	1.56	0.18	0.00	0.00	0.00
1995	104	1200	1548.5	1410.5	138.0											0.0192	0.21	0.19	0.02	0.00	0.00	0.00
1995	104	1400	1541.5	1223.0	318.5											0.0192	0.21	0.17	0.04	0.00	0.00	0.00
1995	104	1600	1400.0	1247.5	152.5											0.0192	0.19	0.17	0.02	0.00	0.00	0.00
1995	104	1800	1322.0	1247.5	74.5											0.0192	0.18	0.17	0.01	0.00	0.00	0.00
1995	105	1000	1177.0	1071.0	106.0											0.0192	1.30	1.18	0.12	0.00	0.00	0.00
1995	106	1200	1139.5	1090.0	49.5											0.0192	0.16	0.15	0.01	0.00	0.00	0.00
1995	105	1400	1199.9	1104.5	95.4											0.0192	0.17	0.15	0.01	0.00	0.00	0.00
1995	105	1515	1253.0	1086.7	166.3											0.0192	0.11	0.09	0.01	0.00	0.00	0.00
1995	105	1600	1118.5	201.8	916.7											0.0192	0.06	0.01	0.05	0.00	0.00	0.00
1995	105	1800	1125.5	1037.0	88.5											0.0192	0.16	0.14	0.01	0.00	0.00	0.00
1995	106	1000	1076.0	996.5	79.5											0.0192	1.19	1.10	0.09	0.00	0.00	0.00
1995	106	1200	1101.0	1014.2	86.8											0.0192	0.15	0.14	0.01	0.00	0.00	0.00

Appendix E4

1	2	3	4.0	5.0	6.0	7.0	8.0	9.0	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1995	106	1400	1178.7	971.7	206.9											0.0192	0.16	0.13	0.03	0.00	0.00	0.00
1995	106	1500	1145.0	993.0	152.0		34.5	344.8				385		27.05	0.13	0.0192	0.08	0.07	0.01	0.00	0.24	2.42
1995	106	1600	1094.0	1000.0	94.0											0.0233	0.09	0.08	0.01	0.00	0.00	0.00
1995	106	1800	1101.0	970.0	131.0											0.0233	0.18	0.16	0.02	0.00	0.00	0.00
1995	107	1000	964.5	895.5	69.0											0.0233	1.29	1.20	0.09	0.00	0.00	0.00
1995	107	1200	998.0	871.0	127.0											0.0233	0.17	0.15	0.02	0.00	0.00	0.00
1995	107	1400	1017.5	872.5	145.0											0.0233	0.17	0.15	0.02	0.00	0.00	0.00
1995	107	1420	989.4	871.0	118.4	839.9			109.8	7.5						0.0273	0.03	0.03	0.00	20.45	0.00	0.00
1995	107	1600	999.5	892.4	107.1											0.0250	0.15	0.13	0.02	0.00	0.00	0.00
1995	107	1800	1008.0	883.5	124.5											0.0250	0.18	0.16	0.02	0.00	0.00	0.00
1995	108	1000	845.0	808.0	37.0											0.0250	1.22	1.16	0.05	0.00	0.00	0.00
1995	108	1200	866.0	787.0	79.0											0.0250	0.16	0.14	0.01	0.00	0.00	0.00
1995	108	1330	256.0	210.4	45.6											0.0227	0.03	0.03	0.01	0.00	0.00	0.00
1995	108	1400	896.0	780.0	116.0											0.0227	0.04	0.03	0.00	0.00	0.00	0.00
1995	108	1600	968.4	850.7	117.7											0.0227	0.16	0.14	0.02	0.00	0.00	0.00
1995	108	1800	935.0	822.6	112.5											0.0227	0.15	0.13	0.02	0.00	0.00	0.00
1995	109	1000	849.0	780.5	68.5											0.0227	1.11	1.02	0.09	0.00	0.00	0.00
1995	109	1200	900.0	766.5	133.5											0.0227	0.15	0.13	0.02	0.00	0.00	0.00
1995	109	1400	856.0	764.5	91.5											0.0227	0.14	0.12	0.01	0.00	0.00	0.00
1995	109	1445	947.3	778.7	168.7											0.0227	0.02	0.02	0.00	0.00	0.00	0.00
1995	109	1600	849.0	768.0	81.0											0.0227	0.12	0.11	0.01	0.00	0.00	0.00
1995	109	1800	826.0	777.0	49.0											0.0227	0.14	0.13	0.01	0.00	0.00	0.00
1995	110	1000	912.0	775.0	137.0											0.0227	1.19	1.01	0.18	0.00	0.00	0.00
1995	110	1200	850.5	741.5	109.0											0.0227	0.14	0.12	0.02	0.00	0.00	0.00
1995	110	1400	871.5	706.5	165.0											0.0227	0.14	0.12	0.03	0.00	0.00	0.00
1995	110	1435	886.0	740.0	146.0											0.0227	0.04	0.04	0.01	0.00	0.00	0.00
1995	110	1600	863.0	756.0	107.0											0.0210	0.09	0.08	0.01	0.00	0.00	0.00
1995	110	1800	880.5	773.5	107.0											0.0210	0.13	0.12	0.02	0.00	0.00	0.00
1995	111	1000	843.5	787.5	56.0											0.0210	1.02	0.95	0.07	0.00	0.00	0.00
1995	111	1200	847.0	794.5	52.5											0.0210	0.13	0.12	0.01	0.00	0.00	0.00
1995	111	1400	954.5	741.5	213.0											0.0210	0.14	0.11	0.03	0.00	0.00	0.00
1995	111	1440	956.0	747.0	209.0											0.0192	0.04	0.03	0.01	0.00	0.00	0.00
1995	111	1600	1005.2	725.9	279.4	658.9										0.0137	0.07	0.05	0.02	5.25	0.00	0.00
1995	111	1800	851.2	756.3	94.9											0.0137	0.08	0.07	0.01	0.00	0.00	0.00
1995	112	1800	889.0	752.5	136.5											0.0137	1.05	0.89	0.16	0.00	0.00	0.00
1995	113	1000	862.0	763.5	98.5											0.0137	0.68	0.60	0.08	0.00	0.00	0.00
1995	113	1200	831.5	776.0	55.5											0.0137	0.08	0.08	0.01	0.00	0.00	0.00

Appendix E4

1	2	3	4.0	5.0	6.0	7.0	8.0	9.0	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1995	113	1400	876.3	756.5	119.8											0.0137	0.09	0.07	0.01	0.00	0.00	0.00
1995	113	1510	1128.8	682.9	445.8	616.1								28.5	0.39	0.0082	0.04	0.02	0.02	1.42	0.00	0.00
1995	114	1400	930.0	769.0	161.0	687.5										0.0107	0.82	0.68	0.14	0.60	0.00	0.00
1995	114	1510	892.5	787.0	105.5	737.4			108.2	7.8		345				0.0131	0.05	0.04	0.01	0.04	0.00	0.00
1995	114	1800	932.0	747.5	184.5											0.0131	0.12	0.10	0.02	0.00	0.00	0.00
1995	114	2200	906.5	765.3	141.3											0.0131	0.17	0.14	0.03	0.00	0.00	0.00
1995	115	0200	855.0	803.0	52.0											0.0131	0.16	0.15	0.01	0.00	0.00	0.00
1995	115	0600	840.5	821.0	19.5											0.0131	0.16	0.15	0.00	0.00	0.00	0.00
1995	115	1000	889.0	792.0	97.0											0.0131	0.17	0.15	0.02	0.00	0.00	0.00
1995	115	1400	935.5	763.5	172.0											0.0131	0.18	0.14	0.03	0.00	0.00	0.00
1995	115	1500	930.0	783.0	147.0											0.0131	0.04	0.04	0.01	0.00	0.00	0.00
1995	116	1200	890.9	808.5	82.4											0.0131	0.88	0.80	0.08	0.00	0.00	0.00
1995	116	1500	894.0	720.5	173.5											0.0131	0.13	0.10	0.02	0.00	0.00	0.00
1995	117	1200	885.5	769.0	116.5											0.0082	0.06	0.05	0.01	0.00	0.00	0.00
1995	117	1420	935.6	738.6	197.0		17.9	108.9								0.0082	0.64	0.51	0.14	0.00	0.29	1.76
1995	118	1200	837.6	741.9	95.7											0.0082	0.05	0.04	0.01	0.00	0.00	0.00
1995	118	1400	837.5	761.3	76.3											0.0082	0.64	0.58	0.06	0.00	0.00	0.00
1995	119	1200	828.9	722.7	106.2	673.4						319				0.0082	0.59	0.51	0.08	3.06	0.00	0.00
1995	120	1200	852.6	712.8	139.8	659.3						319				0.0082	0.60	0.51	0.10	0.47	0.00	0.00
1995	121	1200	830.1	705.3	124.8	650.6						308				0.0082	0.59	0.50	0.09	0.46	0.00	0.00
1995	121	1210	863.4	689.1	174.3	636.5			97.27	7.7		330				0.0082	0.00	0.00	0.00	0.00	0.00	0.00
1995	122	1200	836.4	682.8	153.6											0.0064	0.46	0.37	0.08	0.00	0.00	0.00
1995	122	1440	799.8	664.5	135.3		not dete	114.6					13.44	28.85	0.21	0.0045	0.03	0.03	0.01	0.00	0.00	0.41
1995	123	1200	801.9	614.7	187.2											0.0045	0.28	0.21	0.06	0.00	0.00	0.00
1995	123	1240	840.3	613.5	226.8											0.0045	0.01	0.01	0.00	0.00	0.00	0.00
1995	124	1200	812.7	639.0	173.7											0.0045	0.31	0.24	0.07	0.00	0.00	0.00
1995	125	1200	806.4	636.0	170.4											0.0045	0.31	0.25	0.07	0.00	0.00	0.00
1995	125	1340	854.1	649.8	204.3											0.0045	0.02	0.02	0.01	0.00	0.00	0.00
1995	126	1145	830.7	671.1	159.6											0.0045	0.30	0.24	0.06	0.00	0.00	0.00
1995	126	1200	802.2	635.4	166.8											0.0045	0.00	0.00	0.00	0.00	0.00	0.00
1995	127	1200	966.0	606.0	360.0											0.0045	0.38	0.24	0.14	0.00	0.00	0.00
1995	127	1430	925.5	603.3	322.2											0.0045	0.04	0.02	0.01	0.00	0.00	0.00
1995	128	1200	844.5	649.8	194.7	594.9										0.0045	0.29	0.23	0.07	1.71	0.00	0.00
1995	128	1330	862.8	660.3	202.5	603.9			129.8	8.1						0.0045	0.02	0.02	0.00	0.01	0.00	0.00
1995	129	1200	869.7	666.3	203.4											0.0045	0.32	0.24	0.07	0.00	0.00	0.00
1995	129	1340	828.0	715.5	112.5		11.7	39.7					12.58	32.05	0.25	0.0045	0.02	0.02	0.00	0.00	0.03	0.11
1995	130	1140	901.8	730.5	171.3											0.0031	0.22	0.18	0.04	0.00	0.00	0.00

Appendix E4

1	2	3	4.0	5.0	6.0	7.0	8.0	9.0	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1995	131	1500	944.4	768.0	176.4											0.0019	0.18	0.14	0.03	0.00	0.00	0.00
1995	132	1315	964.8	778.8	186.0											0.0019	0.15	0.12	0.03	0.00	0.00	0.00
1995	133	1445	1245.0	552.0	693.0											0.0019	0.22	0.10	0.12	0.00	0.00	0.00
1995	134															0.0019	0.00	0.00	0.00	0.00	0.00	0.00
1995	135	1000	926.7	778.8	147.9	703.8			162.8	7.8		341				0.0019	0.28	0.23	0.04	1.06	0.00	0.00
1995	136	1440	1249.8	762.6	487.2		30.3	108.1					11.02	36.65	1.53	0.0045	0.58	0.35	0.22	0.00	0.05	0.17
1995	137	1430	1072.8	733.8	339.0											0.0019	0.18	0.12	0.06	0.00	0.00	0.00
1995	138															0.0019	0.00	0.00	0.00	0.00	0.00	0.00
1995	139	1425	1179.0	580.2	598.8											0.0019	0.31	0.15	0.16	0.00	0.00	0.00
1995	140															0.0000	0.00	0.00	0.00	0.00	0.00	0.00
1995	141																					
1995	142																					
1995	143																					
1995	144																					
1995	145																					
1995	146																					
1995	147																					
1995	148																					
1995	149																					
1995	150																					
1995	151																					
1995	152																					
1995	153	2000	2274.5	823.4	1451.1	663.6										0.0031	1.10	0.40	0.70	0.95	0.00	0.00
1995	154	1017	2076.0	1018.5	1057.5	864.0	103.7	3749.8				533	6.98	62.1	1.92	0.0031	0.33	0.16	0.17	0.14	0.12	4.24
1995	154	1200	2315.0	1127.5	1187.5											0.0025	0.04	0.02	0.02	0.00	0.00	0.00
1995	154	1430	1998.9	1060.5	938.4	876.5	151.6	3105.8	228	7.6		546	8.95	63.1	1.77	0.0019	0.03	0.02	0.02	0.03	0.00	0.10
1995	154	2030	1600.0	895.5	704.5	771.2	159.1	1735.5				440	8.1	57.8	1.45	0.0045	0.15	0.09	0.07	0.07	0.02	0.17
1995	155	1200	1735.1	933.6	801.5											0.0045	0.44	0.23	0.20	0.00	0.00	0.00
1995	155	1420	1068.4	873.4	195.0	783.6	79.0	324.4								0.0045	0.04	0.03	0.01	0.23	0.02	0.09
1995	156	1200	1188.5	957.5	231.0											0.0038	0.35	0.28	0.07	0.00	0.00	0.00
1995	156	1430	1325.0	979.0	346.0	872.6			155.7	7.8						0.0031	0.04	0.03	0.01	0.28	0.00	0.00
1995	157	1200	1305.2	1070.0	235.2											0.0025	0.25	0.21	0.05	0.00	0.00	0.00
1995	158	1200	1236.0	979.0	257.0											0.0019	0.20	0.16	0.04	0.00	0.00	0.00
1995	159															0.0000	0.00	0.00	0.00	0.00	0.00	0.00
1995	160																					
1995	161																					
1995	162																					

Appendix E4

1	2	3	4.0	5.0	6.0	7.0	8.0	9.0	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1995	163																					
1995	164																					
1995	165																					
1995	166																					
1995	167																					
1995	167	2023	1110.9	957.6	153.3	1052.7	97.2	163.5					42.24	70.89	0.89	0.0131	2.86	2.46	0.39	5.77	0.25	0.42
1995	167	2200	1071.0	611.1	459.9	518.7										0.0162	0.10	0.06	0.04	0.05	0.00	0.00
1995	168	0000	2228.1	1024.8	1203.3	840.0										0.0162	0.26	0.12	0.14	0.10	0.00	0.00
1995	168	0200	2228.1	1371.3	856.8	1052.1										0.0162	0.26	0.16	0.10	0.12	0.00	0.00
1995	168	0400	3414.6	2251.2	1163.4	1927.6										0.0162	0.40	0.26	0.14	0.22	0.00	0.00
1995	168	0600	3303.3	2648.1	655.2	2157.5										0.0162	0.39	0.31	0.08	0.25	0.00	0.00
1995	168	0705	2663.6	2325.5	338.1	1936.2	2785.5	4003.6				800	32.96	69.9	1.24	0.0192	0.20	0.17	0.03	0.14	1.77	2.54
1995	168	0800	2265.9	1948.8	317.1	1697.9										0.0192	0.14	0.12	0.02	0.11	0.00	0.00
1995	168	0949	1746.6	1356.6	390.0	1113.0	1290.5	2296.0				590		69.4	0.95	0.0192	0.22	0.17	0.05	0.14	0.24	0.43
1995	168	1320	1362.9	1085.7	277.2	882.0	640.9	1391.7	143.4	7.7			30.6	51.7	0.8	0.0229	0.40	0.31	0.08	0.26	0.19	0.40
1995	168	1400	1672.0	1396.0	276.0											0.0229	0.09	0.08	0.02	0.00	0.00	0.00
1995	168	1550	1123.5	942.9	180.6	802.2	381.0	1246.7	137.8	7.7		495	32.22	65.73	0.7	0.0265	0.20	0.17	0.03	0.18	0.09	0.29
1995	168	1600	1411.0	1136.0	275.0											0.0701	0.06	0.05	0.01	0.00	0.00	0.00
1995	168	1800	1190.9	930.3	260.6											0.0701	0.60	0.47	0.13	0.00	0.00	0.00
1995	168	1900	3549.0	2829.6	719.4	2517.6	1022.4	3198.8			15	466	18.76	43.9	0.71	0.1137	1.45	1.16	0.29	2.41	0.98	3.06
1995	168	2000	1004.0	805.5	198.5											0.1137	0.41	0.33	0.08	0.00	0.00	0.00
1995	168	2200	4659.9	3987.9	672.0											0.1137	3.81	3.26	0.55	0.00	0.00	0.00
1995	168	2205	1148.0	1009.0	139.0	978.0	191.6	806.2				330	23.97	45.9	0.35	0.1137	0.04	0.03	0.00	1.23	0.24	1.02
1995	169	0000	1026.9	789.4	237.5											0.0911	0.65	0.50	0.15	0.00	0.00	0.00
1995	169	0200	734.0	631.0	103.0											0.0911	0.48	0.41	0.07	0.00	0.00	0.00
1995	169	0400	677.0	585.0	92.0											0.0911	0.44	0.38	0.06	0.00	0.00	0.00
1995	169	0600	635.0	546.0	89.0											0.0911	0.42	0.36	0.06	0.00	0.00	0.00
1995	169	0800	599.0	528.0	71.0											0.0911	0.39	0.35	0.05	0.00	0.00	0.00
1995	169	0847	526.0	452.2	73.8	490.0	315.3	165.1				323	30.51	57.2	0.24	0.0685	0.10	0.09	0.01	1.69	1.09	0.57
1995	169	1000	625.8	535.5	90.3											0.0685	0.19	0.16	0.03	0.00	0.00	0.00
1995	169	1200	596.4	564.9	31.5											0.0685	0.29	0.28	0.02	0.00	0.00	0.00
1995	169	1400	1108.8	550.2	558.6											0.0685	0.55	0.27	0.28	0.00	0.00	0.00
1995	169	1545	567.2	443.9	123.3	472.1	155.0	78.5		7.6		305	21.93	43.9	0.25	0.0685	0.24	0.19	0.05	0.81	0.27	0.13
1995	169	1600	506.1	499.8	6.3											0.0685	0.03	0.03	0.00	0.00	0.00	0.00
1995	169	1800	520.8	468.3	52.5											0.0685	0.26	0.23	0.03	0.00	0.00	0.00
1995	169	2000	535.5	438.9	96.6											0.0685	0.26	0.22	0.05	0.00	0.00	0.00
1995	169	2100	464.0	442.0	22.0	405.0	56.8	62.1				336	17.07	35.1	0.23	0.0685	0.11	0.11	0.01	0.52	0.07	0.08

Appendix E4

1	2	3	4.0	5.0	6.0	7.0	8.0	9.0	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1995	169	2200	506.1	506.1	0.0											0.0685	0.12	0.12	0.00	0.00	0.00	0.00
1995	170	0000	476.7	417.9	58.8											0.0685	0.24	0.21	0.03	0.00	0.00	0.00
1995	170	0200	491.4	438.9	52.5											0.0685	0.24	0.22	0.03	0.00	0.00	0.00
1995	170	0400	476.7	447.3	29.4											0.0685	0.24	0.22	0.01	0.00	0.00	0.00
1995	170	0600	468.3	432.6	35.7											0.0685	0.23	0.21	0.02	0.00	0.00	0.00
1995	170	0800	453.6	424.2	29.4											0.0685	0.22	0.21	0.01	0.00	0.00	0.00
1995	170	0930	405.0	398.1	6.9	395.0	15.5	41.2				290	12.33	38.4	0.19	0.0685	0.15	0.15	0.00	1.22	0.05	0.13
1995	170	1000	454.8	429.6	25.2											0.0829	0.07	0.06	0.00	0.00	0.00	0.00
1995	170	1200	439.0	415.2	23.8											0.0829	0.26	0.25	0.01	0.00	0.00	0.00
1995	170	1400	446.8	410.2	36.6											0.0829	0.27	0.24	0.02	0.00	0.00	0.00
1995	170	1600	426.8	403.0	23.8											0.0829	0.25	0.24	0.01	0.00	0.00	0.00
1995	170	1800	525.2	434.6	90.6											0.0829	0.31	0.26	0.05	0.00	0.00	0.00
1995	170	2000	579.8	515.8	64.0											0.0829	0.35	0.31	0.04	0.00	0.00	0.00
1995	170	2024	600.0	526.5	73.5	470.0	22.4	318.2				340	18.84	44	0.27	0.0973	0.08	0.07	0.01	1.54	0.07	1.04
1995	170	2200	658.8	574.8	84.0											0.0898	0.34	0.30	0.04	0.00	0.00	0.00
1995	171	0000	578.4	519.4	59.0											0.0898	0.37	0.34	0.04	0.00	0.00	0.00
1995	171	0200	519.4	482.8	36.6											0.0898	0.34	0.31	0.02	0.00	0.00	0.00
1995	171	0400	492.8	454.8	38.0											0.0898	0.32	0.29	0.02	0.00	0.00	0.00
1995	171	0600	486.4	443.2	43.2											0.0898	0.31	0.29	0.03	0.00	0.00	0.00
1995	171	0800	479.8	449.8	30.0											0.0898	0.31	0.29	0.02	0.00	0.00	0.00
1995	171	1000	472.6	452.6	20.0											0.0898	0.31	0.29	0.01	0.00	0.00	0.00
1995	171	1018	453.0	420.0	33.0	405.0	14.2	60.5		7.6	10	312	19.08	42.8	0.2	0.0823	0.04	0.04	0.00	1.82	0.06	0.27
1995	171	1200	476.2	446.2	30.0											0.0754	0.22	0.21	0.01	0.00	0.00	0.00
1995	171	1400	467.6	447.6	20.0											0.0754	0.25	0.24	0.01	0.00	0.00	0.00
1995	171	1600	470.6	442.6	28.0											0.0754	0.26	0.24	0.02	0.00	0.00	0.00
1995	171	1800	456.2	415.2	41.0											0.0754	0.25	0.23	0.02	0.00	0.00	0.00
1995	171	2000	452.6	422.4	30.2											0.0754	0.25	0.23	0.02	0.00	0.00	0.00
1995	171	2011	394.6	365.4	29.2	392.5	10.5	43.8	111	8.0		312	20.43	40.6	0.18	0.0685	0.02	0.02	0.00	1.05	0.03	0.12
1995	171	2200	433.8	408.8	25.0											0.0754	0.21	0.20	0.01	0.00	0.00	0.00
1995	172	0000	439.0	402.2	36.8											0.0754	0.24	0.22	0.02	0.00	0.00	0.00
1995	172	0200	416.0	392.2	23.8											0.0754	0.23	0.21	0.01	0.00	0.00	0.00
1995	172	0400	442.7	402.0	40.7											0.0754	0.24	0.22	0.02	0.00	0.00	0.00
1995	172	0600	413.0	385.3	27.7											0.0754	0.22	0.21	0.02	0.00	0.00	0.00
1995	172	0920	357.2	335.0	22.3	354.7	5.6	26.7			10	302	17.45	40	0.18	0.0823	0.35	0.33	0.02	1.30	0.02	0.10
1995	172	1200	377.6													0.0823	0.30	0.26	0.04	0.00	0.00	0.00
1995	172	1400	403.0	384.2	18.8											0.0823	0.24	0.23	0.01	0.00	0.00	0.00
1995	172	1600	395.8	386.4	9.4											0.0823	0.23	0.23	0.01	0.00	0.00	0.00

Appendix E4

1	2	3	4.0	5.0	6.0	7.0	8.0	9.0	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1995	172	1800	390.6	379.8	10.8											0.0823	0.23	0.23	0.01	0.00	0.00	0.00
1995	172	2000	386.4	372.6	13.8											0.0823	0.23	0.22	0.01	0.00	0.00	0.00
1995	172	2000	369.0	365.0	4.0	336.0	6.5	30.8								0.0823	0.00	0.00	0.00	1.06	0.02	0.10
1995	172	2200	414.6	371.0	43.6											0.0754	0.23	0.20	0.02	0.00	0.00	0.00
1995	173	0000	390.6	371.8	18.8											0.0754	0.21	0.20	0.01	0.00	0.00	0.00
1995	173	0200	390.0	367.4	22.6											0.0754	0.21	0.20	0.01	0.00	0.00	0.00
1995	173	0400	400.2	367.4	32.8											0.0754	0.22	0.20	0.02	0.00	0.00	0.00
1995	173	0600	383.4	361.2	22.2											0.0754	0.21	0.20	0.01	0.00	0.00	0.00
1995	173	0800	389.2	371.0	18.2											0.0754	0.21	0.20	0.01	0.00	0.00	0.00
1995	173	1000	379.8	361.6	18.2											0.0754	0.21	0.20	0.01	0.00	0.00	0.00
1995	173	1200	384.8	281.0	103.8											0.0754	0.21	0.15	0.06	0.00	0.00	0.00
1995	173	1200	362.0	355.0	7.0	332.6	9.0	34.2					16.26	38.6	0.18	0.0685	0.00	0.00	0.00	1.44	0.04	0.15
1995	173	1600	379.8	359.4	20.4											0.0685	0.37	0.35	0.02	0.00	0.00	0.00
1995	173	2000	408.8	391.4	17.4											0.0685	0.40	0.39	0.02	0.00	0.00	0.00
1995	174	0000	406.0	375.4	30.6											0.0685	0.40	0.37	0.03	0.00	0.00	0.00
1995	174	0400	399.4	377.6	21.8											0.0685	0.39	0.37	0.02	0.00	0.00	0.00
1995	174	1330	408.8	388.6	20.2	338.0	2.3	34.2								0.0685	0.96	0.91	0.05	2.13	0.01	0.22
1995	174	1600	395.8	369.8	26.0											0.0518	0.18	0.17	0.01	0.00	0.00	0.00
1995	174	2000	425.2	382.0	43.2											0.0518	0.32	0.28	0.03	0.00	0.00	0.00
1995	175	0000	425.3	395.8	29.5											0.0518	0.32	0.30	0.02	0.00	0.00	0.00
1995	175	0400	421.0	400.1	20.9											0.0518	0.31	0.30	0.02	0.00	0.00	0.00
1995	175	0800	430.4	396.5	33.9											0.0518	0.32	0.30	0.03	0.00	0.00	0.00
1995	175	1200	421.6	392.8	28.8											0.0518	0.31	0.29	0.02	0.00	0.00	0.00
1995	175	1514	421.0	410.0	11.0	360.7	7.3	23.3								0.0351	0.17	0.17	0.00	1.66	0.03	0.11
1995	175	1600	452.6	405.2	47.4											0.0351	0.04	0.04	0.00	0.00	0.00	0.00
1995	175	2000	469.5	419.9	49.6											0.0351	0.24	0.21	0.03	0.00	0.00	0.00
1995	176	0000	458.5	428.6	29.9											0.0351	0.23	0.22	0.02	0.00	0.00	0.00
1995	176	0400	456.3	427.9	28.4											0.0351	0.23	0.22	0.01	0.00	0.00	0.00
1995	176	0800	459.3	432.3	27.0											0.0351	0.23	0.22	0.01	0.00	0.00	0.00
1995	176	1200	446.1	423.5	22.6											0.0351	0.23	0.21	0.01	0.00	0.00	0.00
1995	176	1530	451.7	424.8	26.9	379.9	6.7	33.9								0.0351	0.20	0.19	0.01	1.16	0.02	0.10
1995	177	1547	486.6	472.0	14.6	437.9	5.8	32.1								0.0351	1.49	1.46	0.04	1.34	0.02	0.10
1995	177	1600	522.0	481.2	40.8											0.0308	0.01	0.01	0.00	0.00	0.00	0.00
1995	177	2000	513.2	494.2	19.0											0.0308	0.23	0.22	0.01	0.00	0.00	0.00
1995	178	0000	518.4	484.8	33.6											0.0308	0.23	0.22	0.01	0.00	0.00	0.00
1995	178	0400	516.2	497.2	19.0											0.0308	0.23	0.22	0.01	0.00	0.00	0.00
1995	178	0800	485.4	469.4	16.0											0.0308	0.22	0.21	0.01	0.00	0.00	0.00

Appendix E4

1	2	3	4.0	5.0	6.0	7.0	8.0	9.0	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1995	178	1035	480.8	470.0	10.8	425.2	7.2	23.1	112.2	7.5		326				0.0265	0.12	0.12	0.00	0.87	0.01	0.06
1995	178	1200	486.2	465.0	21.2											0.0246	0.06	0.06	0.00	0.00	0.00	0.00
1995	178	1600	486.2	459.2	27.0											0.0246	0.17	0.16	0.01	0.00	0.00	0.00
1995	178	2000	511.8	455.6	56.2											0.0246	0.18	0.16	0.02	0.00	0.00	0.00
1995	179	0000	484.0	457.8	26.2											0.0246	0.17	0.16	0.01	0.00	0.00	0.00
1995	179	1455	490.2	462.0	28.2											0.0227	0.60	0.56	0.03	0.00	0.00	0.00
1995	179	2000	495.4	461.4	34.0											0.0227	0.21	0.19	0.01	0.00	0.00	0.00
1995	180	0000	505.6	460.8	44.8											0.0210	0.15	0.14	0.01	0.00	0.00	0.00
1995	180	0400	496.2	462.8	33.4											0.0210	0.15	0.14	0.01	0.00	0.00	0.00
1995	180	0800	503.4	445.5	57.9											0.0210	0.15	0.13	0.02	0.00	0.00	0.00
1995	180	1200	486.0	447.0	39.0											0.0210	0.15	0.14	0.01	0.00	0.00	0.00
1995	180	1545	487.0	478.2	8.8					7.7						0.0192	0.13	0.12	0.00	0.00	0.00	0.00
1995	181	1200	503.4	468.7	34.7											0.0192	0.70	0.66	0.06	0.00	0.00	0.00
1995	181	1500	513.6	493.4	20.2											0.0192	0.11	0.10	0.00	0.00	0.00	0.00
1995	182	1200	524.4	497.0	27.4											0.0192	0.76	0.72	0.04	0.00	0.00	0.00
1995	182	1515	519.4	502.0	17.4		6.1	26.1					10.53	30.2	0.35	0.0192	0.12	0.11	0.00	0.00	0.05	0.20
1995	183	1200	548.1	510.9	37.2											0.0162	0.66	0.62	0.06	0.00	0.00	0.00
1995	183	1647	543.1	520.9	22.2											0.0131	0.10	0.09	0.00	0.00	0.00	0.00
1995	184	1200	548.0	524.4	23.6											0.0131	0.52	0.50	0.02	0.00	0.00	0.00
1995	185	1115	600.2	581.0	19.2	521.9	11.3	34.5	112.5	7.5		318				0.0131	0.66	0.64	0.02	5.77	0.04	0.12
1995	185	1200	607.4	566.0	41.4											0.0107	0.02	0.02	0.00	0.00	0.00	0.00
1995	186	1024	580.2	530.2	50.0						14		8.85	31.4	0.39	0.0082	0.38	0.35	0.03	0.00	0.00	0.00
1995	186	1200	600.2	509.4	90.8											0.0107	0.04	0.03	0.01	0.00	0.00	0.00
1995	187	1200	578.2	576.6	1.6											0.0107	0.53	0.53	0.00	0.00	0.00	0.00
1995	187	1450	626.8	594.6	32.2					7.7		321				0.0131	0.08	0.08	0.00	0.00	0.00	0.00
1995	188	1140	589.8	554.0	35.8											0.0105	0.46	0.44	0.03	0.00	0.00	0.00
1995	188	1200	584.0	564.8	19.2											0.0105	0.01	0.01	0.00	0.00	0.00	0.00
1995	189	1200	596.2	566.2	30.0											0.0105	0.54	0.51	0.03	0.00	0.00	0.00
1995	190	1200	633.4	615.6	17.8	576.9	9.4	67.6	114.2	7.5	20		8.16	33.4	0.51	0.0105	0.57	0.56	0.02	2.56	0.04	0.30
1995	190	1200	638.4	607.0	31.4											0.0186	0.00	0.00	0.00	0.00	0.00	0.00
1995	191	1200	693.0	644.9	48.1											0.0185	1.11	1.03	0.08	0.00	0.00	0.00
1995	192	1050	544.0	496.8	47.2							312				0.0265	1.19	1.08	0.10	0.00	0.00	0.00
1995	192	1200	646.3	539.4	107.0											0.0186	0.05	0.04	0.01	0.00	0.00	0.00
1995	193	1200	528.6	508.4	20.2											0.0186	0.84	0.81	0.03	0.00	0.00	0.00
1995	194	1011	561.6	542.2	19.4											0.0105	0.47	0.45	0.02	0.00	0.00	0.00
1995	194	1200	551.6	518.5	33.0											0.0094	0.03	0.03	0.00	0.00	0.00	0.00
1995	195	1200	582.4	547.2	35.2											0.0094	0.47	0.44	0.03	0.00	0.00	0.00

Appendix E4

1	2	3	4.0	5.0	6.0	7.0	8.0	9.0	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1995	196	1200	647.8	599.6	48.2											0.0082	0.46	0.42	0.03	0.00	0.00	0.00
1995	196	1200	617.0	574.6	42.4											0.0082	0.00	0.00	0.00	0.00	0.00	0.00
1995	197	1200	637.8	584.6	53.2											0.0082	0.45	0.41	0.04	0.00	0.00	0.00
1995	198	1045	741.8	624.8	117.0	590.2	25.2	78.6	120.5	7.2		321	4.28	32.4	0.8	0.0082	0.50	0.42	0.08	5.46	0.23	0.73
1995	199	1200	706.2	636.4	69.8											0.0064	0.41	0.37	0.04	0.00	0.00	0.00
1995	200	1130	898.2	696.1	202.1											0.0045	0.34	0.26	0.08	0.00	0.00	0.00
1995	200	1200	781.7	700.4	81.3											0.0045	0.01	0.01	0.00	0.00	0.00	0.00
1995	201	1200	801.8	699.0	102.8											0.0045	0.31	0.27	0.04	0.00	0.00	0.00
1995	202	1042	824.8	713.4	111.4											0.0045	0.30	0.26	0.04	0.00	0.00	0.00
1995	202	1200	832.0	710.6	121.4											0.0045	0.02	0.01	0.00	0.00	0.00	0.00
1995	203	1200	854.4	624.6	229.8											0.0045	0.33	0.24	0.09	0.00	0.00	0.00
1995	204	1200	891.6	695.4	196.2											0.0045	0.35	0.27	0.08	0.00	0.00	0.00
1995	205	1030	770.2	685.4	84.8	630.0	33.3	98.6	135.2	7.4		325	4.74	39.7	0.79	0.0045	0.28	0.25	0.03	1.82	0.10	0.28
1995	205	1200	779.2	667.0	112.2											0.0045	0.02	0.02	0.00	0.00	0.00	0.00
1995	206															0.0045	0.00	0.00	0.00	0.00	0.00	0.00
1995	207	1018	917.2	755.2	162.0											0.0045	0.69	0.56	0.12	0.00	0.00	0.00
1995	208	1200	780.8	602.0	178.8											0.0045	0.33	0.25	0.07	0.00	0.00	0.00
1995	209	1115	862.4	591.8	270.6											0.0045	0.32	0.22	0.10	0.00	0.00	0.00
1995	209	1200	707.8	586.8	121.0											0.0045	0.01	0.01	0.00	0.00	0.00	0.00
1995	210	1200	705.0	548.4	156.6											0.0045	0.27	0.21	0.06	0.00	0.00	0.00
1995	211	1200	658.8	546.2	112.6											0.0045	0.26	0.21	0.04	0.00	0.00	0.00
1995	212	1110	795.4	629.3	165.6	539.0	33.8	81.9	139.9	7.5			4.78	40.4	0.89	0.0045	0.30	0.24	0.06	1.57	0.10	0.24
1995	212	1200	712.4	556.4	156.0											0.0038	0.01	0.01	0.00	0.00	0.00	0.00
1995	213	1200	683.4	553.4	130.0											0.0038	0.22	0.18	0.04	0.00	0.00	0.00
1995	214	1048	951.8	584.4	367.4											0.0031	0.24	0.15	0.09	0.00	0.00	0.00
1995	214	1200	697.8	567.2	130.6											0.0031	0.01	0.01	0.00	0.00	0.00	0.00
1995	215																					
1995	216																					
1995	217																					
1995	218																					
1995	219	1145	742.8	632.4	110.4	526.3	34.8	109.5	141.1	7.6		404	3.57	40.3	1.02	0.0045	0.00	0.00	0.00	0.32	0.02	0.07
1995	219	2117	736.0	618.0	118.0	529.0	28.0	22.6				342	3.69	37.7	0.84	0.0131	0.50	0.42	0.08	0.36	0.02	0.02
1995	220	1014	1148.0	818.0	330.0	730.0	229.2	322.0				456	16.35	34.5	0.92		2.19	1.56	0.63	1.39	0.44	0.62
1995	220	1400	2384.0	1982.0	402.0												4.77	3.96	0.80	0.00	0.00	0.00
1995	220	1538	2868.0	2522.0	346.0	2090.0	900.0	1062.8				513	18.93	32.8	0.87	0.2160	3.84	3.38	0.46	6.98	3.01	3.55
1995	220	1600	1738.0	1594.0	144.0												0.34	0.31	0.03	0.00	0.00	0.00
1995	220	1800	1544.0	1422.0	122.0												2.30	2.12	0.18	0.00	0.00	0.00

Appendix E4

1	2	3	4.0	5.0	6.0	7.0	8.0	9.0	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1995	220	2000	1422.0	1236.0	186.0												0.22	0.19	0.03	0.00	0.00	0.00
1995	220	1943	1324.0	1244.0	80.0	1070.0	490.0	512.2				388	16.86	33.4	0.35	0.1710	0.15	0.14	0.01	2.09	0.96	1.00
1995	220	2200	1350.0	1214.0	136.0												1.66	1.49	0.17	0.00	0.00	0.00
1995	221	0000	1236.0	1084.0	152.0												1.57	1.38	0.19	0.00	0.00	0.00
1995	221	0200	1070.0	920.0	150.0												1.49	1.28	0.21	0.00	0.00	0.00
1995	221	0400	1292.0	834.0	458.0												1.72	1.11	0.61	0.00	0.00	0.00
1995	221	0600	770.0	676.0	94.0												0.99	0.87	0.12	0.00	0.00	0.00
1995	221	0800	648.0	590.0	58.0												0.73	0.66	0.06	0.00	0.00	0.00
1995	221	1000	640.0	574.0	66.0	516.0	23.9	108.8				342	23.01	37.8	0.31	0.1928	0.75	0.67	0.08	4.54	0.21	0.96
1995	221	1200	650.2	564.4	85.8												0.96	0.83	0.13	0.00	0.00	0.00
1995	221	1400	558.4	475.2	83.2												1.02	0.87	0.15	0.00	0.00	0.00
1995	221	1600	490.8	425.6	65.2												0.94	0.82	0.13	0.00	0.00	0.00
1995	221	1640	454.0	352.0	102.0	310.0	10.3	45.2	106.4	7.4		299	14.49	17.2	0.33	0.2938	0.37	0.29	0.08	1.87	0.06	0.27
1995	221	1800	446.4	389.8	56.6												0.59	0.52	0.07	0.00	0.00	0.00
1995	221	2000	396.2	353.2	43.0												0.84	0.75	0.09	0.00	0.00	0.00
1995	221	2200	393.4	349.6	43.8												0.78	0.70	0.09	0.00	0.00	0.00
1995	222	0000	370.4	329.4	41.0												0.70	0.62	0.08	0.00	0.00	0.00
1995	222	0200	348.2	312.2	36.0												0.60	0.54	0.06	0.00	0.00	0.00
1995	222	0400	339.6	315.8	23.8												0.59	0.55	0.04	0.00	0.00	0.00
1995	222	0600	336.0	299.4	36.6												0.53	0.47	0.06	0.00	0.00	0.00
1995	222	0800	324.2	290.2	34.0												0.50	0.45	0.05	0.00	0.00	0.00
1995	222	1000	316.8	295.2	21.6												0.47	0.43	0.03	0.00	0.00	0.00
1995	222	1150	316.0	288.0	28.0	246.0	10.2	109.9				292	13.89	34.8	0.18	0.1928	0.38	0.35	0.03	4.09	0.17	1.83
1995	222	1200	322.4	293.2	29.2												0.06	0.05	0.01	0.00	0.00	0.00
1995	222	1400	323.4	292.4	31.0												0.45	0.41	0.04	0.00	0.00	0.00
1995	222	1600	318.4	298.2	20.2												0.44	0.41	0.03	0.00	0.00	0.00
1995	222	1610	313.0	298.0	15.0	249.0	12.1	67.2				371	13.77	34.8	0.14		0.04	0.04	0.00	0.76	0.04	0.21
1995	222	1800	326.2	293.2	33.0												0.31	0.28	0.03	0.00	0.00	0.00
1995	222	2000	314.8	295.2	19.6												0.33	0.31	0.02	0.00	0.00	0.00
1995	222	2200	298.2	284.8	13.4												0.28	0.27	0.01	0.00	0.00	0.00
1995	223	0000	292.6	267.8	24.8												0.28	0.25	0.02	0.00	0.00	0.00
1995	223	0200	294.0	279.0	15.0												0.28	0.26	0.01	0.00	0.00	0.00
1995	223	0400	313.8	282.6	31.2												0.28	0.25	0.03	0.00	0.00	0.00
1995	223	0600	292.6	279.8	12.8												0.24	0.23	0.01	0.00	0.00	0.00
1995	223	0800	307.4	287.6	19.8												0.25	0.24	0.02	0.00	0.00	0.00
1995	223	1000	307.4	292.6	14.8												0.25	0.24	0.01	0.00	0.00	0.00
1995	223	1050	280.0	280.0	0.0	228.0	11.2	50.8				331	14.49	36.2	0.18	0.0973	0.09	0.09	0.00	1.94	0.10	0.43

Appendix E4

1	2	3	4.0	5.0	6.0	7.0	8.0	9.0	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1995	223	1200	317.9	312.6	5.3												0.16	0.16	0.00	0.00	0.00	0.00
1995	223	1400	328.6	316.5	12.1												0.27	0.26	0.01	0.00	0.00	0.00
1995	223	1600	317.9	299.1	18.8												0.26	0.24	0.02	0.00	0.00	0.00
1995	223	1800	315.8	306.2	9.6												0.26	0.25	0.01	0.00	0.00	0.00
1995	223	2000	317.9	300.2	17.7												0.26	0.25	0.01	0.00	0.00	0.00
1995	223	2200	324.0	315.4	8.6												0.27	0.26	0.01	0.00	0.00	0.00
1995	224	0000	339.6	313.7	25.9												0.28	0.26	0.02	0.00	0.00	0.00
1995	224	0200	338.5	324.3	14.2												0.28	0.27	0.01	0.00	0.00	0.00
1995	224	0400	330.7	315.1	15.6												0.25	0.24	0.01	0.00	0.00	0.00
1995	224	0600	351.6	349.5	2.1												0.25	0.24	0.00	0.00	0.00	0.00
1995	224	0800	358.0	328.9	29.1												0.25	0.23	0.02	0.00	0.00	0.00
1995	224	1000	346.3	340.3	6.0												0.21	0.20	0.00	0.00	0.00	0.00
1995	224	1010	339.6	322.5	17.1	283.7	13.9	46.1	120.1	7.7		308	14.25	37.1	0.21	0.0685	0.17	0.16	0.01	2.69	0.13	0.44
1995	224	1200	337.9	318.4	19.5												0.17	0.16	0.01	0.00	0.00	0.00
1995	224	1400	339.6	318.7	20.9												0.15	0.14	0.01	0.00	0.00	0.00
1995	224	1600	335.4	317.0	18.4												0.14	0.13	0.01	0.00	0.00	0.00
1995	224	1800	330.1	310.6	19.5												0.11	0.11	0.01	0.00	0.00	0.00
1995	224	2000	324.1	319.1	5.0												0.08	0.08	0.00	0.00	0.00	0.00
1995	224	2200	330.4	312.0	18.4												0.08	0.08	0.00	0.00	0.00	0.00
1995	225	0000	329.7	311.3	18.4												0.08	0.08	0.00	0.00	0.00	0.00
1995	225	0200	331.1	311.7	19.4												0.08	0.08	0.00	0.00	0.00	0.00
1995	225	0400	335.4	318.7	16.7												0.08	0.08	0.00	0.00	0.00	0.00
1995	225	0600	324.8	323.4	1.4												0.08	0.08	0.00	0.00	0.00	0.00
1995	225	0800	334.3	323.4	10.9												0.08	0.08	0.00	0.00	0.00	0.00
1995	225	1200	337.9	337.5	0.4												0.11	0.11	0.00	0.00	0.00	0.00
1995	225	1145	349.6	335.7	13.9	309.7	12.6	40.8		7.4		376	13.02	36.8	0.18	0.0450	0.10	0.10	0.00	1.25	0.05	0.17
1995	225	1400	355.5	349.5	6.0												0.13	0.13	0.00	0.00	0.00	0.00
1995	225	1800	368.3	343.8	24.5												0.21	0.20	0.01	0.00	0.00	0.00
1995	225	2200	364.4	349.1	15.3												0.16	0.16	0.01	0.00	0.00	0.00
1995	226	0200	364.7	359.4	5.3												0.18	0.18	0.00	0.00	0.00	0.00
1995	226	1600	365.4	355.9	9.5												0.18	0.18	0.00	0.00	0.00	0.00
1995	226	1000	365.1	353.4	11.7												0.18	0.18	0.01	0.00	0.00	0.00
1995	226	1045	369.0	359.5	9.5	320.5	7.1	24.5				347	11.19	37.3	0.18	0.0351	0.03	0.03	0.00	0.96	0.02	0.07
1995	226	1200	378.3	357.7	20.6												0.06	0.06	0.00	0.00	0.00	0.00
1995	226	1600	367.7	360.6	7.1												0.16	0.16	0.00	0.00	0.00	0.00
1995	226	2000	380.5	361.3	19.2												0.16	0.15	0.01	0.00	0.00	0.00
1995	227	0000	382.6	369.5	13.2												0.17	0.16	0.01	0.00	0.00	0.00

Appendix E4

1	2	3	4.0	5.0	6.0	7.0	8.0	9.0	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1995	227	0400	395.0	378.3	16.7												0.15	0.14	0.01	0.00	0.00	0.00
1995	227	0800	390.8	376.2	14.6												0.13	0.13	0.00	0.00	0.00	0.00
1995	227	1130	398.4	377.5	20.9	344.7	8.8	22.9					10.68	35.6	0.24	0.0351	0.14	0.13	0.01	0.87	0.02	0.06
1995	227	1200	391.8	375.8	16.0												0.02	0.02	0.00	0.00	0.00	0.00
1995	227	1600	404.6	383.7	20.9												0.15	0.15	0.01	0.00	0.00	0.00
1995	227	2000	411.4	393.6	17.8												0.16	0.15	0.01	0.00	0.00	0.00
1995	228	0000	406.8	398.2	8.6												0.21	0.20	0.00	0.00	0.00	0.00
1995	228	0400	407.5	395.7	11.8												0.21	0.20	0.01	0.00	0.00	0.00
1995	228	0800	411.0	397.5	13.5												0.17	0.16	0.01	0.00	0.00	0.00
1995	228	1125	412.1	403.4	8.8	364.5	14.6	35.0				433	9.36	35.7	0.25	0.0265	0.14	0.13	0.00	0.94	0.04	0.09
1995	228	1200	413.3	402.1	11.2												0.02	0.02	0.00	0.00	0.00	0.00
1995	228	1600	426.4	397.1	29.3												0.16	0.15	0.01	0.00	0.00	0.00
1995	228	2000	424.2	407.0	17.2												0.15	0.15	0.01	0.00	0.00	0.00
1995	229	0000	437.6	408.0	29.6												0.13	0.12	0.01	0.00	0.00	0.00
1995	229	0400	432.7	407.3	25.4												0.12	0.11	0.01	0.00	0.00	0.00
1995	229	0800	432.7	409.8	22.9												0.12	0.11	0.01	0.00	0.00	0.00
1995	229	1140	437.6	419.3	18.3	390.8	17.8	39.0	126.1	7.8		439	8.43	33.4	0.25	0.0192	0.11	0.11	0.00	0.74	0.03	0.07
1995	230	1200	443.9	426.8	17.2												0.73	0.70	0.03	0.00	0.00	0.00
1995	231	1200	453.8	428.5	25.3												0.38	0.36	0.02	0.00	0.00	0.00
1995	231	1450	455.3	445.0	10.3					7.7		441	7.47	33.7	0.31	0.0105	0.02	0.02	0.00	0.00	0.00	0.00
1995	232	1200	459.0	438.3	20.7												0.22	0.21	0.01	0.00	0.00	0.00
1995	233	1200	469.2	449.5	19.7												0.24	0.23	0.01	0.00	0.00	0.00
1995	233	1210	467.4	445.3	22.1		26.5	46.9				363	7.23			0.0082	0.00	0.00	0.00	0.00	0.09	0.17
1995	234	1120	464.1	426.0	38.1	396.4			120.4	8.1		365				0.0082	0.32	0.29	0.03	1.67	0.00	0.00
1995	234	1200	469.5	418.0	51.5											0.0082	0.01	0.01	0.00	0.00	0.00	0.00
1995	235	1124	477.2	452.9	24.3											0.0082	0.33	0.31	0.02	0.00	0.00	0.00
1995	235	1200	461.8	436.8	25.0											0.0082	0.01	0.01	0.00	0.00	0.00	0.00
1995	236	1200	472.9	456.8	16.1											0.0082	0.34	0.32	0.01	0.00	0.00	0.00
1995	237	1150	493.1	474.8	18.2											0.0082	0.35	0.33	0.01	0.00	0.00	0.00
1995	237	1200	502.2	475.0	27.2											0.0094	0.00	0.00	0.00	0.00	0.00	0.00
1995	238	1200	475.8	462.7	13.1											0.0094	0.39	0.38	0.01	0.00	0.00	0.00
1995	239	1200	486.5	458.4	28.1											0.0094	0.40	0.37	0.02	0.00	0.00	0.00
1995	240	1155	472.5	437.9	34.6	398.5	21.3	40.0	115.6	7.8		302	7.32	35.8	0.54	0.0094	0.38	0.35	0.03	1.82	0.11	0.21
1995	240	1200	480.1	436.1	44.0											0.0094	0.00	0.00	0.00	0.00	0.00	0.00
1995	241															0.0105	0.00	0.00	0.00	0.00	0.00	0.00
1995	242	1100	457.0	453.5	3.5											0.0105	0.81	0.80	0.01	0.00	0.00	0.00
1995	242	1200	497.4	428.7	68.7											0.0094	0.02	0.01	0.00	0.00	0.00	0.00

Appendix E4

1	2	3	4.0	5.0	6.0	7.0	8.0	9.0	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1995	243	1200	471.6	413.8	57.8											0.0094	0.38	0.34	0.05	0.00	0.00	0.00
1995	244	1125	495.0	464.8	30.2											0.0082	0.34	0.32	0.02	0.00	0.00	0.00
1995	244	1200	463.4	413.0	50.4											0.0082	0.01	0.01	0.00	0.00	0.00	0.00
1995	245	1200	493.4	447.5	45.9											0.0082	0.35	0.32	0.03	0.00	0.00	0.00
1995	246	1200	518.0	481.6	36.4											0.0082	0.37	0.34	0.03	0.00	0.00	0.00
1995	247	1120	577.6	547.5	30.1	502.9	24.1	45.0	133.7	7.6		319		39.8		0.0082	0.40	0.38	0.02	2.96	0.14	0.26
1995	247	1200	571.9	523.3	48.6											0.0082	0.01	0.01	0.00	0.00	0.00	0.00
1995	248	1200	528.2	505.9	22.3											0.0082	0.37	0.36	0.02	0.00	0.00	0.00
1995	249	1200	582.3	522.6	59.7											0.0082	0.41	0.37	0.04	0.00	0.00	0.00
1995	250	1045	565.3	530.6	34.7											0.0082	0.38	0.36	0.02	0.00	0.00	0.00
1995	250	1200	552.1	497.2	54.9											0.0041	0.01	0.01	0.00	0.00	0.00	0.00
1995	251	1200	574.7	513.5	61.2											0.0041	0.20	0.18	0.02	0.00	0.00	0.00
1995	252	1200	591.2	516.0	75.2											0.0041	0.21	0.18	0.03	0.00	0.07	0.13
1995	253															0.0000	0.00	0.00	0.00	0.00	0.00	0.00

Appendix E5: Physical and chemical data collected from the agricultural watershed A2, site 2 for 1994 and 1995.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1994	114	1625	416.8	396.6	20.2					7.2	9	235				0.0200	1.22	1.16	0.06			
1994	116	1413	374.2	346.2	26.0						7	390				0.0158	1.39	1.28	0.10			
1994	119	1510	350.4	327.6	22.8					7.5	13	244				0.0125	1.65	1.54	0.11			
1994	123	1135	434.0	423.8	10.2	366.4				7.1	6	304				0.0158	1.07	1.04	0.03			
1994	125	1145	349.3	343.5	5.8					7.2	8	269				0.0125	0.74	0.73	0.01			
1994	127	1350	391.0	378.7	12.3					7.2	14	263				0.0111	1.07	1.04	0.03			
1994	130	1445	401.2	387.4	13.8					7.5	16	276				0.0098	0.91	0.88	0.03			
1994	133	1500	377.2	358.0	19.2					7.6	16	370				0.0077	0.68	0.64	0.03			
1994	136	0350	383.6	372.0	11.6	654.2				7.6	9.5	291				0.0087	0.08	0.08	0.00			
1994	136	0845	426.0	392.3	33.7	681.0				7.5	9	327				0.0158	0.18	0.16	0.01			
1994	136	1505	475.6	401.8	73.8	329.8				7.6		356				0.0224	0.26	0.22	0.04			
1994	136	2135	448.0	417.2	30.8	343.8				7.6		350				0.0252	0.46	0.43	0.03			
1994	137	0920	378.9	179.7	199.2	311.0				7.5	8	304				0.0224	0.37	0.17	0.19			
1994	137	2123	350.0	339.2	10.8	286.6				7.4	9	286				0.0224	1.02	0.99	0.03			
1994	139	1445	366.6	350.8	15.8	297.4				7.5	10	274				0.0178	0.81	0.77	0.03			
1994	140	2130	386.8	370.0	16.8	324.4				7.5		288				0.0211	0.48	0.46	0.02			
1994	141	1030	373.6	358.4	15.2	305.4				7.6		333				0.0317	0.49	0.47	0.02			
1994	141	2155	358.4	333.6	24.8	293.2				7.6		290				0.0317	0.71	0.67	0.05			
1994	142	1735	350.6	338.4	12.2	294.4				7.6		273				0.0252	0.68	0.65	0.02			
1994	143	1605	405.8	390.0	15.8	348.2				7.7		270				0.0224	1.28	1.23	0.05			
1994	145	1120	451.8	432.4	19.4	379.8				7.5		274				0.0178	1.27	1.21	0.05			
1994	147	0950	548.2	532.2	16.0	488.3				7.4	14	282				0.0158	2.17	2.11	0.06			
1994	150	1550	525.8	510.6	15.2					7.3	17	268				0.0125	1.40	1.36	0.04			
1994	152	2000	604.8	475.2	129.6							280				0.0178	0.15	0.12	0.03			
1994	152	2030	474.2	455.6	18.6							284				0.0158	0.23	0.22	0.01			
1994	153	0000	547.3	474.5	72.8							348				0.0178	0.15	0.13	0.02			
1994	153	0400	587.2	502.3	84.9							326				0.0200	0.18	0.15	0.03			
1994	153	0800	553.0	468.8	84.2							298				0.0224	0.17	0.14	0.03			
1994	153	1130	499.6	447.7	51.9											0.0252	0.18	0.16	0.02			
1994	153	1130	450.8	397.0	53.8							279				0.0252	0.16	0.14	0.02			
1994	153	1530	463.0	407.0	56.0							281				0.0252	0.16	0.14	0.02			
1994	153	1930	495.2	437.8	57.4							271				0.0224	0.16	0.14	0.02			
1994	153	2330	488.8	458.6	30.2							270				0.0224	0.16	0.15	0.01			
1994	154	0330	491.0	450.0	41.0							277				0.0224	0.15	0.14	0.01			
1994	154	0730	465.0	442.2	22.8							278				0.0200	0.13	0.13	0.01			
1994	154	1130	458.6	423.4	35.2							266				0.0200	0.13	0.12	0.01			
1994	154	1530	483.8	426.4	57.4							260				0.0200	0.13	0.12	0.02			

Appendix E5

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1994	154	1930	538.2	480.8	57.4							262				0.0178	0.14	0.12	0.01			
1994	154	2330	519.6	483.0	36.6							260				0.0178	0.13	0.12	0.01			
1994	155	0330	515.3	490.4	24.9							264				0.0178	0.13	0.13	0.01			
1994	155	0730	515.2	480.9	34.3							266				0.0178	0.12	0.12	0.01			
1994	155	1130	503.2	459.4	43.8							265				0.0158	0.26	0.23	0.02			
1994	155	2030	567.8	468.6	99.2							259				0.0158	0.24	0.20	0.04			
1994	156	0430	523.0	468.6	54.4							256				0.0140	0.21	0.19	0.02			
1994	156	1230	510.8	450.8	60.0							263				0.0140	0.21	0.18	0.02			
1994	156	2030	560.8	513.6	47.2							259				0.0140	0.21	0.20	0.02			
1994	157	0430	554.4	510.8	43.6							264				0.0125	0.10	0.09	0.01			
1994	157	0830	510.8	469.4	41.4							261				0.0125	0.09	0.08	0.01			
1994	157	1230	543.0	473.6	69.4					7.6		267				0.0111	0.27	0.24	0.03			
1994	158	0100	555.8	499.4	56.4											0.0111	0.35	0.32	0.04			
1994	158	1700	531.6	507.2	24.4											0.0111	0.34	0.32	0.02			
1994	159	0900	557.4	499.4	58.0					7.5		259				0.0111	0.38	0.34	0.04			
1994	160	0200	565.6	553.2	12.4							261				0.0111	0.34	0.33	0.01			
1994	160	1800	580.8	516.8	64.0							269				0.0098	0.33	0.29	0.04			
1994	161	1000	525.6	512.6	13.0						15	264				0.0098	0.30	0.29	0.01			
1994	162	0300	539.4	470.4	69.0							247				0.0087	0.25	0.22	0.03			
1994	162	1900	510.4	452.2	58.2							247				0.0077	0.23	0.20	0.03			
1994	163	1100	507.4	461.0	46.4							249				0.0077	0.05	0.05	0.00			
1994	163	1500	484.2	434.8	49.4						16	250				0.0068	0.07	0.06	0.01			
1994	163	1930	565.8	503.2	62.6							242				0.0098	0.09	0.08	0.01			
1994	163	2330	563.6	498.8	64.8							240				0.0125	0.12	0.11	0.01			
1994	164	0330	545.8	490.8	55.0							240				0.0178	0.16	0.14	0.02			
1994	164	0730	576.8	483.4	93.4							286				0.0224	0.28	0.23	0.04			
1994	164	1130	795.0	551.8	243.2							335				0.0445	0.61	0.42	0.19			
1994	164	1530	962.6	729.6	233.0							333				0.0622	1.29	0.98	0.31			
1994	164	2030	742.2	646.0	96.2							335				0.0865	0.88	0.76	0.11			
1994	165	0030	595.6	533.4	62.2							304				0.0775	0.66	0.60	0.07			
1994	165	0430	559.8	513.8	46.0							301				0.0775	0.59	0.54	0.05			
1994	165	0830	523.2	489.0	34.2							296				0.0694	0.52	0.49	0.03			
1994	165	1230	512.4	454.6	57.8						11	301				0.0694	0.79	0.70	0.09			
1994	165	1900	490.4	447.4	43.0						11	277				0.0622	0.42	0.38	0.04			
1994	165	1200	489.6	459.8	29.8							279				0.0556	0.39	0.37	0.02			
1994	166	0300	489.6	456.2	33.4							258				0.0556	0.39	0.37	0.03			
1994	166	0700	479.4	440.8	38.6							279				0.0556	0.38	0.35	0.03			

Appendix E5

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1994	166	1100	465.6	430.6	35.0							279				0.0556	0.37	0.34	0.03			
1994	166	1500	437.2	400.2	37.0							270				0.0556	0.33	0.30	0.03			
1994	166	1900	416.8	393.6	23.2							252				0.0498	0.30	0.28	0.02			
1994	166	2300	382.6	358.2	24.4							252				0.0498	0.26	0.24	0.02			
1994	167	0300	374.8	255.4	19.4							255				0.0445	0.24	0.23	0.01			
1994	167	0700	371.2	338.0	33.2							253				0.0445	0.23	0.20	0.02			
1994	167	1100	364.0	332.4	31.6							260				0.0397	0.21	0.19	0.02			
1994	167	1500	379.8	349.6	30.2							236				0.0397	0.13	0.12	0.01			
1994	167	1730	371.4	341.0	30.4							241				0.0355	0.19	0.17	0.02			
1994	167	2130	359.8	337.2	22.6							244				0.0355	0.37	0.34	0.02			
1994	168	0530	353.2	333.0	20.2							239				0.0355	0.17	0.16	0.01			
1994	168	0930	338.0	320.6	17.4							241				0.0317	0.15	0.15	0.01			
1994	168	1330	337.2	315.6	21.6							240				0.0317	0.15	0.14	0.01			
1994	168	1730	360.6	333.0	27.6							241				0.0317	0.16	0.15	0.01			
1994	168	2130	362.6	340.2	22.4							245				0.0317	0.17	0.16	0.01			
1994	169	0130	374.2	346.8	27.4							242				0.0317	0.16	0.15	0.01			
1994	169	0530	359.8	332.2	27.6							240				0.0282	0.15	0.14	0.01			
1994	169	0930	361.2	324.2	37.0							242				0.0282	0.17	0.15	0.02			
1994	169	1400	364.3	322.3	42.0							234				0.0282	0.14	0.12	0.02			
1994	169	1800	385.5	336.6	48.9							226				0.0252	0.14	0.12	0.02			
1994	169	2200	408.4	361.7	46.7							230				0.0252	0.15	0.13	0.02			
1994	170	0200	432.5	394.6	37.9							230				0.0252	0.15	0.14	0.01			
1994	170	0600	435.1	391.7	43.4							237				0.0224	0.14	0.13	0.01			
1994	170	1000	393.8	354.4	39.4							235				0.0224	0.13	0.11	0.01			
1994	170	1400	388.7	347.5	41.2							233				0.0224	0.12	0.11	0.01			
1994	170	1800	399.7	353.7	46.0							234				0.0200	0.11	0.10	0.01			
1994	170	2000	416.8	392.8	24.0							231				0.0200	0.11	0.11	0.01			
1994	171	0200	428.1	396.4	31.7							235				0.0178	0.11	0.10	0.01			
1994	171	0600	423.4	396.0	27.4							234				0.0178	0.11	0.10	0.01			
1994	171	1000	408.4	366.5	41.9							233				0.0178	0.10	0.09	0.01			
1994	171	1400	417.6	362.5	55.1						20	232				0.0158	0.02	0.02	0.00			
1994	171	1500	221.6	199.4	22.2							229				0.0158	0.10	0.09	0.01			
1994	171	2300	239.8	213.3	26.6							233				0.0140	0.05	0.04	0.01			
1994	172	0300	247.5	222.0	25.5							238				0.0140	0.05	0.04	0.01			
1994	172	0700	236.2	214.0	22.2							236				0.0140	0.05	0.04	0.00			
1994	172	1100	225.6	206.3	19.3							235				0.0140	0.04	0.04	0.00			
1994	172	1500	238.0	211.1	26.9							231				0.0125	1.59	1.41	0.18			

Appendix E5

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1994	178	1130	479.7	440.8	38.9											0.0140	0.67	0.61	0.05			
1994	179	1500	633.0	420.4	212.6						14					0.0140	0.13	0.08	0.04			
1994	179	1900	493.4	449.0	44.4											0.0140	0.10	0.09	0.01			
1994	179	2300	499.2	451.2	48.0											0.0140	0.20	0.18	0.02			
1994	180	0700	508.8	455.6	53.2						13					0.0140	0.21	0.18	0.02			
1994	180	1500	438.4	388.2	50.2											0.0140	0.08	0.07	0.01			
1994	180	1900	431.2	386.8	44.4											0.0125	0.08	0.07	0.01			
1994	180	2300	429.8	391.2	38.6											0.0125	0.08	0.07	0.01			
1994	181	0300	433.4	411.2	22.2											0.0125	0.08	0.07	0.00			
1994	181	0700	427.3													0.0125	0.07	0.06	0.01			
1994	181	1100	427.3													0.0111	0.44	0.39	0.05			
1994	182	1300	439.0	405.4	33.6	405.4										0.0111	1.08	1.00	0.08			
1994	182	2330	447.8	350.0	97.8						15	276				0.1197	0.77	0.60	0.17			
1994	183	0330	417.8	385.0	32.8							264				0.1197	0.65	0.60	0.05			
1994	183	0730	440.8	384.2	56.6							252				0.0964	0.58	0.51	0.07			
1994	183	1130	1086.0	740.0	346.0						16	307				0.0865	1.22	0.83	0.39			
1994	183	1530	682.8	565.2	117.6							301				0.0694	0.72	0.60	0.12			
1994	183	1930	583.8	527.2	56.6							284				0.0775	0.65	0.59	0.06			
1994	183	2330	581.6									325				0.0775	0.69	0.61	0.08			
1994	184	0330	663.8									320				0.0865	0.83	0.74	0.09			
1994	184	0730	595.8													0.0865	0.74	0.66	0.08			
1994	184	1130	606.6	502.2	104.4							278				0.0865	0.40	0.33	0.07			
1994	184	1330	509.8	469.8	40.0							270				0.0964	0.71	0.65	0.06			
1994	184	1730	497.8	482.2	15.6							284				0.0964	0.69	0.67	0.02			
1994	184	2130	520.0	500.4	19.6							304				0.0964	0.68	0.66	0.03			
1994	185	0130	481.4	460.3	21.1							275				0.0865	0.60	0.57	0.03			
1994	185	0530	466.2	441.3	24.9											0.0865	0.55	0.52	0.03			
1994	185	0930	442.1	424.6	17.5							265				0.0775	2.67	2.56	0.11			
1994	186	1120	412.9								14	257				0.0622	0.48	0.43	0.05			
1994	186	1500	428.6	398.2	30.4											0.0556	0.33	0.30	0.02			
1994	186	1900	412.6	392.4	20.2											0.0498	0.30	0.28	0.01			
1994	186	2300	432.2	407.6	24.6											0.0498	0.29	0.28	0.02			
1994	187	0300	454.6													0.0445	0.29	0.26	0.03			
1994	187	700	426.4													0.0445	1.03	0.92	0.11			
1994	187	2300	423.4													0.0397	0.24	0.22	0.03			
1994	188	0300	444.4	422.8	21.6											0.0397	0.24	0.23	0.01			
1994	188	0700	438.6	411.2	27.4						16					0.0355	0.67	0.63	0.04			

Appendix E5

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1994	188	1900	409.8	376.0	33.8							245				0.0355	0.21	0.19	0.02			
1994	188	2300	411.2	394.0	17.2							252				0.0355	0.21	0.20	0.01			
1994	189	0300	464.6	428.6	36.0							244				0.0355	0.24	0.22	0.02			
1994	189	0700	454.4	421.4	33.0							390				0.0355	0.23	0.22	0.02			
1994	189	1100	453.0	422.0	31.0							279				0.0355	0.23	0.22	0.02			
1994	189	1500	441.4									275				0.0355	0.68	0.60	0.07			
1994	190	0300	474.6	419.8	54.8							276				0.0355	0.24	0.21	0.03			
1994	190	0700	469.6	450.8	18.8							275				0.0355	0.24	0.23	0.01			
1994	190	1100	443.6	421.4	22.2							259				0.0355	2.91	2.77	0.15			
1994	192	1130	428.6	412.2	16.4					7.4	14	387				0.0397	0.70	0.67	0.03			
1994	192	2330	524.6	399.4	125.2							277				0.0355	0.80	0.61	0.19			
1994	193	1130	514.0	437.2	76.8							282				0.0355	0.79	0.67	0.12			
1994	193	2330	460.6	395.2	65.4							290				0.0355	0.45	0.38	0.06			
1994	194	0730	488.0	431.4	56.6						14	290				0.0317	0.83	0.74	0.10			
1994	194	2230	579.0	438.2	140.8							259				0.0317	0.79	0.60	0.19			
1994	195	1030	505.4	409.6	95.8											0.0317	0.65	0.53	0.12			
1994	195	2230	498.8	415.4	83.4							242				0.0282	0.61	0.51	0.10			
1994	196	1130	530.4	445.4	85.0							253				0.0282	0.65	0.54	0.10			
1994	196	2230	493.2	411.8	81.4											0.0282	0.60	0.50	0.10			
1994	197	1030	539.6	445.4	94.2											0.0282	0.66	0.54	0.11			
1994	197	2230	517.4	395.4	122.0											0.0282	0.60	0.46	0.14			
1994	198	1030	553.8	455.4	98.4											0.0252	0.60	0.50	0.11			
1994	198	2230	526.0	423.2	102.8											0.0252	0.57	0.46	0.11			
1994	199	1030	544.6	439.6	105.0						18					0.0252	0.58	0.47	0.11			
1994	199	2300	578.6	442.2	136.4							270				0.0224	0.50	0.38	0.12			
1994	200	1100	536.4	443.0	93.4							259				0.0178	0.39	0.32	0.07			
1994	200	2300	523.0	437.4	85.6						15	281				0.0158	0.32	0.27	0.05			
1994	201	1100	548.4	448.6	99.8							286				0.0125	0.26	0.21	0.05			
1994	201	2200	602.2	449.8	152.4											0.0111	0.29	0.21	0.07			
1994	202	1000	584.0	461.3	122.7											0.0111	0.26	0.21	0.06			
1994	202	2200	579.0	443.4	135.6											0.0098	0.25	0.19	0.06			
1994	203	1000	584.0	494.6	89.4						16					0.0098	0.22	0.19	0.03			
1994	203	2200	539.5	441.4	98.1							251				0.0077	0.18	0.15	0.03			
1994	204	1000	529.6	436.4	93.2							260				0.0077	0.17	0.14	0.03			
1994	204	2200	558.0	440.0	118.0							241				0.0068	0.16	0.13	0.03			
1994	205	1000	531.8	441.4	90.4							142				0.0068	0.15	0.12	0.03			
1994	205	2200	593.6	468.4	125.2							255				0.0060	0.15	0.12	0.03			

Appendix E5

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1994	206	1000	543.8	458.4	85.4						18	318				0.0060	0.13	0.11	0.02			
1994	206	2200	592.0	473.6	118.4							248				0.0053	0.13	0.10	0.03			
1994	207	1000	537.8	444.8	93.0							249				0.0047	0.11	0.09	0.02			
1994	207	2200	604.2	473.6	130.6							254				0.0047	0.12	0.10	0.03			
1994	208	1000	610.6	512.6	98.0							256				0.0047	0.12	0.10	0.02			
1994	208	2200	624.4	535.0	89.4							259				0.0047	0.12	0.10	0.02			
1994	209	1000	603.2	540.4	62.7							267				0.0042	0.11	0.10	0.01			
1994	209	2200	608.2	498.2	110.0							248				0.0042	0.11	0.09	0.02			
1994	210	1000	593.0	485.8	107.2							253				0.0042	0.11	0.09	0.02			
1994	210	2200	670.4	558.0	112.4							264				0.0042	0.12	0.10	0.02			
1994	211	1000	609.8	523.6	86.2							154				0.0042	0.11	0.09	0.02			
1994	211	2200	685.6	570.4	115.2							264				0.0042	0.12	0.10	0.02			
1994	212	1000	622.8	515.6	107.2							262				0.0042	0.24	0.20	0.04			
1994	213	1200	611.4	474.1	137.3											0.0042	0.21	0.16	0.05			
1994	214	1200	625.2	502.8	122.4											0.0037	0.20	0.16	0.04			
1994	215	1200	640.4	531.8	108.6											0.0037	0.19	0.16	0.03			
1994	216	1200	637.6	526.0	111.6											0.0032	0.00	0.00	0.00			
1995	75	1530	5720.4	5187.6	532.8											0.008	4.25	3.86	0.40	0.00	0.00	0.00
1995	76	1030	4047.6	3752.8	294.8											0.015	4.15	3.85	0.30	0.00	0.00	0.00
1995	75	1548	4693.2	4104.0	589.2					7.5		603				0.015	1.60	1.40	0.20	0.00	0.00	0.00
1995	77	1200	2981.3	2643.6	337.7		1176.4	6663.1								0.023	4.64	4.11	0.53	0.00	4.31	24.41
1995	77	1830	3835.2	3432.0	403.2		212.9	12030.6								0.030	2.69	2.41	0.28	0.00	0.15	8.45
1995	78	1305	3013.6	2031.2	982.4		798.5	4825.5								0.053	10.69	7.20	3.48	0.00	2.83	17.11
1995	78	1825	4008.5	3839.4	169.1		772.9	3359.7								0.053	4.08	3.91	0.17	0.00	0.79	3.42
1995	79	1455	661.8	605.5	56.3		527.0	3180.5						22.65	0.11	0.075	3.66	3.35	0.31	0.00	2.92	17.61
1995	80	1430	1018.5	924.0	94.5		280.2	1029.2								0.080	6.92	6.28	0.64	0.00	1.90	6.99
1995	80	1840	1025.6	974.8	50.8		269.9	1050.3						39.15	0.11	0.095	1.46	1.39	0.07	0.00	0.38	1.50
1995	81	1120	1425.7	1227.8	197.9		293.2	2655.4								0.037	3.20	2.76	0.44	0.00	0.66	5.97
1995	81	1615	1253.6	1160.4	93.2		294.4	2487.5								0.037	0.82	0.76	0.06	0.00	0.19	1.63
1995	82	1840	1265.2	1140.4	124.8											0.028	3.37	3.04	0.33	0.00	0.00	0.00
1995	83	1430	1122.6	1122.4	0.2	956.6										0.028	2.24	2.24	0.00	28.93	0.00	0.00
1995	84	1430	1066.0	1001.2	64.8	856.9										0.028	2.58	2.42	0.16	2.07	0.00	0.00
1995	85	1430	925.2	864.4	60.8		269.6	939.2								0.028	2.24	2.09	0.15	0.00	2.56	8.92
1995	86	1515	850.4	808.0	42.4											0.028	2.12	2.02	0.11	0.00	0.00	0.00
1995	87	1530	721.8	594.8	127.0											0.028	1.75	1.44	0.31	0.00	0.00	0.00
1995	88	1530	597.6	487.6	110.0											0.028	1.45	1.18	0.27	0.00	0.00	0.00

Appendix E5

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1995	89	1505	558.0	442.4	115.6											0.028	1.34	1.06	0.28	0.00	0.00	0.00
1995	90	1630	515.3	409.2	106.1	354.0										0.028	1.32	1.05	0.27	5.21	0.00	0.00
1995	91	1330	501.0	413.6	87.4	349.5										0.028	1.06	0.88	0.18	0.74	0.00	0.00
1995	92	1425	432.0	360.4	71.6		90.8	397.9		7.6		309		18.95	0.01	0.028	1.09	0.91	0.18	0.00	1.54	6.73
1995	93	1150	483.6	404.8	78.8											0.028	1.04	0.87	0.17	0.00	0.00	0.00
1995	94	1450	394.8	314.6	80.3											0.028	1.07	0.86	0.22	0.00	0.00	0.00
1995	95															0.028	0.00	0.00	0.00	0.00	0.00	0.00
1995	96															0.028	0.00	0.00	0.00	0.00	0.00	0.00
1995	97	1430	433.2	362.4	70.8											0.028	3.13	2.62	0.51	0.00	0.00	0.00
1995	98															0.028	0.00	0.00	0.00	0.00	0.00	0.00
1995	99															0.028	0.00	0.00	0.00	0.00	0.00	0.00
1995	100	1520	522.4	471.2	51.2	387.5			113.5	7.0		352				0.028	2.07	1.87	0.20	8.51	0.00	0.00
1995	101	1530	113.6	101.9	11.7		26.4	65.8								0.028	0.28	0.25	0.03	0.00	0.58	1.44
1995	102	1420	363.5	322.3	41.2											0.028	0.84	0.74	0.09	0.00	0.00	0.00
1995	103	1420	290.0	254.2	35.8											0.028	0.70	0.61	0.09	0.00	0.00	0.00
1995	104															0.028	0.00	0.00	0.00	0.00	0.00	0.00
1995	105	1500	407.1	354.0	53.1											0.020	1.51	1.32	0.20	0.00	0.00	0.00
1995	106	1450	334.2	329.2	5.0		21.9	46.9				338		23.55	0.04	0.014	0.40	0.40	0.01	0.00	0.21	0.45
1995	107	1430	286.1	239.4	46.7	193.8			86.2	7.1						0.014	0.34	0.29	0.06	2.57	0.00	0.00
1995	108	1345	989.5	793.8	195.7											0.014	1.16	0.93	0.23	0.00	0.00	0.00
1995	109	1430	243.3	213.1	30.2											0.014	0.30	0.27	0.04	0.00	0.00	0.00
1995	110	1450	236.2	192.0	44.2											0.014	0.29	0.24	0.05	0.00	0.00	0.00
1995	111	1430	199.0	168.2	30.8											0.014	0.24	0.20	0.04	0.00	0.00	0.00
1995	112															0.014	0.00	0.00	0.00	0.00	0.00	0.00
1995	113	1500	197.2	152.8	44.4	101.0	0.0	0.0					1.18	27.2	0.07	0.009	0.34	0.27	0.08	0.66	0.00	0.00
1995	114	1500	173.6	144.2	29.4	91.0			108.1	7.2		383				0.009	0.13	0.11	0.02	0.07	0.00	0.00
1995	115	1445	161.4	134.2	27.2											0.011	0.15	0.12	0.02	0.00	0.00	0.00
1995	116	1450	166.3	126.9	39.4											0.010	0.14	0.11	0.03	0.00	0.00	0.00
1995	117	1450	139.5	123.0	16.5		30.4	54.8								0.010	0.12	0.10	0.01	0.00	0.34	0.61
1995	118	1345	153.5	121.2	32.2											0.011	0.15	0.11	0.03	0.00	0.00	0.00
1995	119															0.011	0.00	0.00	0.00	0.00	0.00	0.00
1995	120															0.011	0.00	0.00	0.00	0.00	0.00	0.00
1995	121	1200	121.9	107.6	14.3	64.3			121.9	7.2		429				0.010	0.32	0.29	0.04	0.40	0.00	0.00
1995	122	1430	136.3	108.7	27.6		5.8	37.7					39.67	36.55	0.05	0.009	0.12	0.09	0.02	0.00	0.03	0.17
1995	123	1230	118.2	103.7	14.5											0.009	0.08	0.07	0.01	0.00	0.00	0.00
1995	124															0.008	0.00	0.00	0.00	0.00	0.00	0.00
1995	125	1330	125.0	104.4	20.6											0.008	0.18	0.15	0.03	0.00	0.00	0.00

Appendix E5

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1995	126	1130	125.7	110.8	14.9											0.007	0.07	0.06	0.01	0.00	0.00	0.00
1995	127	1420	129.1	114.4	14.7											0.007	0.09	0.08	0.01	0.00	0.00	0.00
1995	128	1325	127.1	110.1	17.0	75.3			157.4	7.7						0.006	0.07	0.06	0.01	0.36	0.00	0.00
1995	129	1330	121.3	108.1	13.2		54.0	30.6					45.42	43.75	0.05	0.006	0.06	0.05	0.01	0.00	0.24	0.13
1995	130	1130														0.000						
1995	167	1200																				
1995	168	0700	422.7	320.3	102.4	280.5	370.9	144.6				366	30.08	50.9	0.82	0.00633	0.18	0.14	0.04	0.12	0.16	0.06
1995	168	0940	407.0	379.5	27.5	308.0	368.0	202.1				401	31.48	55.8	0.86	0.00633	0.03	0.02	0.00	0.02	0.02	0.01
1995	168	1313														0.00633	0.00	0.00	0.00	0.00	0.00	0.00
1996	168	1545	453.6	392.7	60.9	287.7	334.1	194.2	127.8	7.6			31.96	51.84	0.57	0.00711	0.07	0.06	0.01	0.04	0.05	0.03
1995	168	2200	813.3	764.9	48.4	675.4	444.9	149.6				300	24.36	39.8	0.16	0.06306	1.16	1.09	0.07	0.96	0.63	0.21
1995	169	0830	607.8	527.0	80.8	464.0	281.0	152.0				330	23.61	46.4	0.22	0.02304	0.53	0.46	0.07	0.40	0.24	0.13
1995	169	1540	444.0	395.0	49.0	333.2	135.8	46.0		7.5		389	23.13	32.6	0.2	0.01752	0.20	0.18	0.02	0.15	0.06	0.02
1995	169	2100	343.0	328.3	14.7	289.8	79.6	34.2				385	22.47	37.9	0.16	0.01569	0.10	0.10	0.00	0.09	0.02	0.01
1995	170	0920	299.0	262.3	36.7	243.0	53.8	32.1				333	21.51	39.2	0.16	0.01328	0.18	0.16	0.02	0.14	0.03	0.02
1995	170	2015	839.0	637.0	202.0	567.9	225.2	118.7				357	22.44	41.4	0.33	0.06305	2.07	1.57	0.50	1.40	0.56	0.29
1995	171	1000	259.0	236.6	22.4	225.0	34.1	20.2		7.6	10	310	18.09	32.9	0.16	0.04152	0.53	0.49	0.05	0.46	0.07	0.04
1995	171	2030	249.7	229.9	19.8	197.7	24.7	25.5	105.0	7.7		270	15.54	36	0.15	0.03358	0.30	0.28	0.02	0.24	0.03	0.03
1995	172	0910	202.4	191.4	11.0	173.8	14.7	19.8				286	14.16	36.3	0.17	0.02432	0.23	0.22	0.01	0.20	0.02	0.02
1995	172	2000	216.0	216.0	0.0	173.5		21.2								0.01956	0.16	0.16	0.00	0.13	0.00	0.02
1995	173	1150	184.0	184.0	0.0	163.4	9.4	21.1					13.32	34.[illegible]	0.14	0.01569	0.16	0.16	0.00	0.16	0.01	0.02
1995	174	1320	219.8	205.5	14.3	159.6	1.6	34.7								0.00894	0.18	0.17	0.01	0.13	0.00	0.03
1995	175	1504	225.3	219.2	6.1	170.8	6.7	33.5								0.00633	0.13	0.13	0.00	0.10	0.00	0.02
1995	176	1520	230.2	222.6	7.6	180.4	3.2	31.6			20					0.00633	0.13	0.12	0.00	0.10	0.00	0.02
1995	177	1535	209.8	194.6	15.2	160.4	3.4	30.0				266				0.01404	0.26	0.24	0.02	0.20	0.00	0.04
1995	178	1018	226.3	219.1	7.2	179.0	7.3	29.8	101.8	7.4		278				0.00894	0.14	0.13	0.00	0.11	0.00	0.02
1995	179	1444	228.9	213.0	15.9											0.00564	0.13	0.12	0.01	0.00	0.00	0.00
1995	180	1515	222.3	209.2	13.1					7.6						0.00446	0.09	0.08	0.01	0.00	0.00	0.00
1995	181	1445	247.7	241.9	5.8											0.00446	0.09	0.09	0.00	0.00	0.00	0.00
1995	182	1430	246.7	236.9	9.8		5.7	21.6					9.63	29.5	0.23	0.00396	0.08	0.06	0.00	0.00	0.01	0.04
1996	183	1530	255.4	245.4	10.0											0.00351	0.08	0.08	0.00	0.00	0.00	0.00
1995	184															0.00374	0.00	0.00	0.00	0.00	0.00	0.00
1995	185	1100	296.6	280.5	16.1	238.6	10.5	16.8	107.6	7.2(8.0)		286				0.00374	0.17	0.16	0.01	0.62	0.01	0.02
1995	186	1012	288.3	273.0	15.3								8.58	28.5	0.2	0.00396	0.10	0.09	0.01	0.00	0.00	0.00
1996	187	1445	293.0	281.5	11.5					7.5		302				0.00312	0.08	0.09	0.00	0.00	0.00	0.00
1995	188	1130	294.9	286.5	8.4											0.00312	0.07	0.07	0.00	0.00	0.00	0.00
1996	189															0.00294	0.00	0.00	0.00	0.00	0.00	0.00

Appendix E5

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1995	190	1140	315.3	286.3	29.0	248.5	6.2	23.2	111.7	7.5			6.66	32	0.29	0.00276	0.15	0.14	0.01	0.34	0.01	0.03
1995	191															0.00276	0.00	0.00	0.00	0.00	0.00	0.00
1995	192	1040	333.8	316.7	17.1							306				0.00276	0.16	0.15	0.01	0.00	0.00	0.00
1995	193															0.00234	0.00	0.00	0.00	0.00	0.00	0.00
1996	194	0960	359.8	337.9	21.9											0.00192	0.12	0.12	0.01	0.00	0.00	0.00
1996	195															0.0018	0.00	0.00	0.00	0.00	0.00	0.00
1995	196	1145	362.7	345.1	17.6											0.00169	0.11	0.11	0.01	0.00	0.00	0.00
1995	197															0.00169	0.00	0.00	0.00	0.00	0.00	0.00
1995	198	1035	348.3	326.8	21.5	283.1	13.4	23.1	113.6	7.0		277	3.77	30.2	0.46	0.00169	0.10	0.09	0.01	0.40	0.02	0.03
1995	199															0.00159	0.00	0.00	0.00	0.00	0.00	0.00
1995	200	1119	350.6	306.7	43.9											0.00159	0.10	0.09	0.01	0.00	0.00	0.00
1996	201															0.00159	0.00	0.00	0.00	0.00	0.00	0.00
1996	202	1030	347.3	321.8	25.5											0.0015	0.09	0.08	0.01	0.00	0.00	0.00
1995	203															0.00159	0.00	0.00	0.00	0.00	0.00	0.00
1995	204															0.00159	0.00	0.00	0.00	0.00	0.00	0.00
1995	205	1023	395.2	301.7	93.5	259.1	9.8	20.1	131.1	7.4		292	3.3	36.2	1	0.00169	0.17	0.13	0.04	0.25	0.01	0.02
1996	206															0.00159	0.00	0.00	0.00	0.00	0.00	0.00
1996	207	1006	356.1	335.7	20.4											0.0015	0.09	0.09	0.01	0.00	0.00	0.00
1996	208															0.0015	0.00	0.00	0.00	0.00	0.00	0.00
1995	209	1100	388.9	320.7	68.2											0.0015	0.10	0.08	0.02	0.00	0.00	0.00
1995	210															0.00357	0.00	0.00	0.00	0.00	0.00	0.00
1995	211															0.00357	0.00	0.00	0.00	0.00	0.00	0.00
1995	212	1066	347.3	321.4	25.9	275.2	5.5	18.8	115.2	7.3		309	3.32	31.8	0.45	0.00564	0.41	0.38	0.03	0.47	0.01	0.03
1996	213															0.00533	0.00	0.00	0.00	0.00	0.00	0.00
1996	214	1036	303.4	278.9	24.5											0.00501	0.27	0.24	0.02	0.00	0.00	0.00
1996	215															0.00501	0.00	0.00	0.00	0.00	0.00	0.00
1995	216	1030	310.3	291.6	18.7											0.00501	0.27	0.25	0.02	0.00	0.00	0.00
1996	217															0.00501	0.00	0.00	0.00	0.00	0.00	0.00
1996	218															0.00502	0.00	0.00	0.00	0.00	0.00	0.00
1995	219	1130	303.7	284.2	19.5	240.1	11.6	36.7	127.3	7.6		334	2.65	34.1	0.44	0.00501	0.40	0.37	0.03	0.73	0.04	0.11
1996	219	2130	353.7	304.4	49.3	261.1	8.1	0.9				280	2.8	30.7	0.5	0.00633	0.08	0.07	0.01	0.06	0.00	0.00
1995	220	1000	677.0	456.0	221.0	423.0	464.7	97.1				254	11.7	23.6	0.43	0.01122	0.34	0.23	0.11	0.21	0.23	0.06
1996	220	1530	1147.0	890.0	257.0	765.0	877.4	94.5				280	10.71	21.7	0.37	0.04613	1.06	0.81	0.23	0.70	0.80	0.09
1996	220	1930	728.0	644.0	84.0	552.0	482.2	89.5				285	11.04	24.6	0.26	0.03018	0.32	0.28	0.04	0.24	0.21	0.04
1996	221	1000	262.0	250.0	12.0	201.0	60.0	12.0				263	9.69	27.5	0.15	0.03184	0.44	0.42	0.02	0.33	0.10	0.02
1995	221	1610	223.0	198.0	25.0	137.0	26.7	6.1	96.7	7.6		251	9.6	19	0.14	0.0271	0.13	0.12	0.02	0.08	0.02	0.00
1995	222	1145	169.0	155.0	14.0	124.0	14.0	63.8				262	10.08	30.8	0.17	0.01569	0.19	0.17	0.02	0.14	0.02	0.07

Appendix E5

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1995	222	1600	198.0	155.0	43.0	113.0	10.8	41.8				257	10.14	31.6	0.2	0.01404	0.04	0.03	0.01	0.02	0.00	0.01
1995	223	1040	174.5	165.5	9.0	130.0	10.7	31.6				279	10.26	31.2	0.21	0.01002	0.12	0.11	0.01	0.09	0.01	0.02
1995	224	1000	174.3	166.5	7.8	132.8	9.9	27.2	107.4	7.8		271	10.32	36.4	0.2	0.00894	0.13	0.13	0.01	0.10	0.01	0.02
1995	225	1130	186.0	176.8	9.2	138.6	8.9	25.5		7.2		271	10.02	32.2	0.19	0.00633	0.11	0.10	0.01	0.08	0.01	0.01
1995	226	1030	190.9	186.6	4.3	148.5	28.1	27.4				336	10.41	32.5	0.2	0.0054	0.09	0.08	0.00	0.07	0.01	0.01
1995	227	1106	194.5	180.0	14.5	148.7	10.5	28.3				314	10.68	32.1	0.22	0.00446	0.08	0.07	0.01	0.06	0.00	0.01
1995	228	1145	199.9	189.2	10.7	158.5	11.6	25.1				376	10.41	32	0.28	0.00312	0.06	0.05	0.00	0.04	0.00	0.01
1995	229	1130	210.1	203.4	6.7	171.5	12.1	27.7	104.5	8.1		371	10.35	30.6	0.25	0.0026	0.05	0.05	0.00	0.04	0.00	0.01
1995	230															0.00226	0.00	0.00	0.00	0.00	0.00	0.00
1995	231	1442	212.9	202.3	10.6					7.7		360	10.29	30.9	0.31	0.00192	0.08	0.07	0.00	0.00	0.00	0.00
1995	232															0.0018	0.00	0.00	0.00	0.00	0.00	0.00
1995	233	1200	239.1	217.3	21.8		16.5	31.6				314	9.54			0.00169	0.07	0.06	0.01	0.00	0.01	0.02
1995	234	1110	208.2	197.3	10.9	170.7	106.2	129.4	106.2	8.1		307				0.00169	0.03	0.03	0.00	0.13	0.01	0.02
1995	235	1100	236.7	217.1	19.6											0.0015	0.03	0.03	0.00	0.00	0.00	0.00
1995	236															0.00159	0.00	0.00	0.00	0.00	0.00	0.00
1995	237	1130	225.7	194.2	31.6											0.00169	0.07	0.06	0.01	0.00	0.00	0.00
1995	238															0.00159	0.00	0.00	0.00	0.00	0.00	0.00
1996	239															0.00159	0.00	0.00	0.00	0.00	0.00	0.00
1995	240	1140	235.7	224.2	11.5	192.6	7.3	20.5	103.9	7.9		280	8.13	30.4	0.39	0.0015	0.09	0.09	0.00	0.13	0.01	0.02
1995	241															0.00141	0.00	0.00	0.00	0.00	0.00	0.00
1995	242	1045	238.6	225.5	13.1											0.00132	0.05	0.05	0.00	0.00	0.00	0.00
1995	243															0.00132	0.00	0.00	0.00	0.00	0.00	0.00
1995	244	1100	243.5	234.7	8.8											0.00132	0.06	0.05	0.00	0.00	0.00	0.00
1995	245															0.00124	0.00	0.00	0.00	0.00	0.00	0.00
1995	246															0.00124	0.00	0.00	0.00	0.00	0.00	0.00
1995	247	1145	271.2	257.7	13.5	228.0	11.7	18.0	113.2	7.4		250	4.76	30.5		0.00116	0.09	0.08	0.00	0.18	0.01	0.01
1995	248															0.00109	0.00	0.00	0.00	0.00	0.00	0.00
1995	249															0.00109	0.00	0.00	0.00	0.00	0.00	0.00
1995	250	1030	230.8	222.1	8.7											0.00102	0.06	0.06	0.00	0.00	0.00	0.00
1995	251															0.00102	0.00	0.00	0.00	0.00	0.00	0.00
1995	252															0.00103	0.00	0.00	0.00	0.00	0.00	0.00
1995	253															0.00103	0.00	0.00	0.00	0.00	0.00	0.00
1995	254															0.00102	0.00	0.00	0.00	0.00	0.00	0.00
1996	255															0	0.00	0.00	0.00	0.13	0.00	0.00